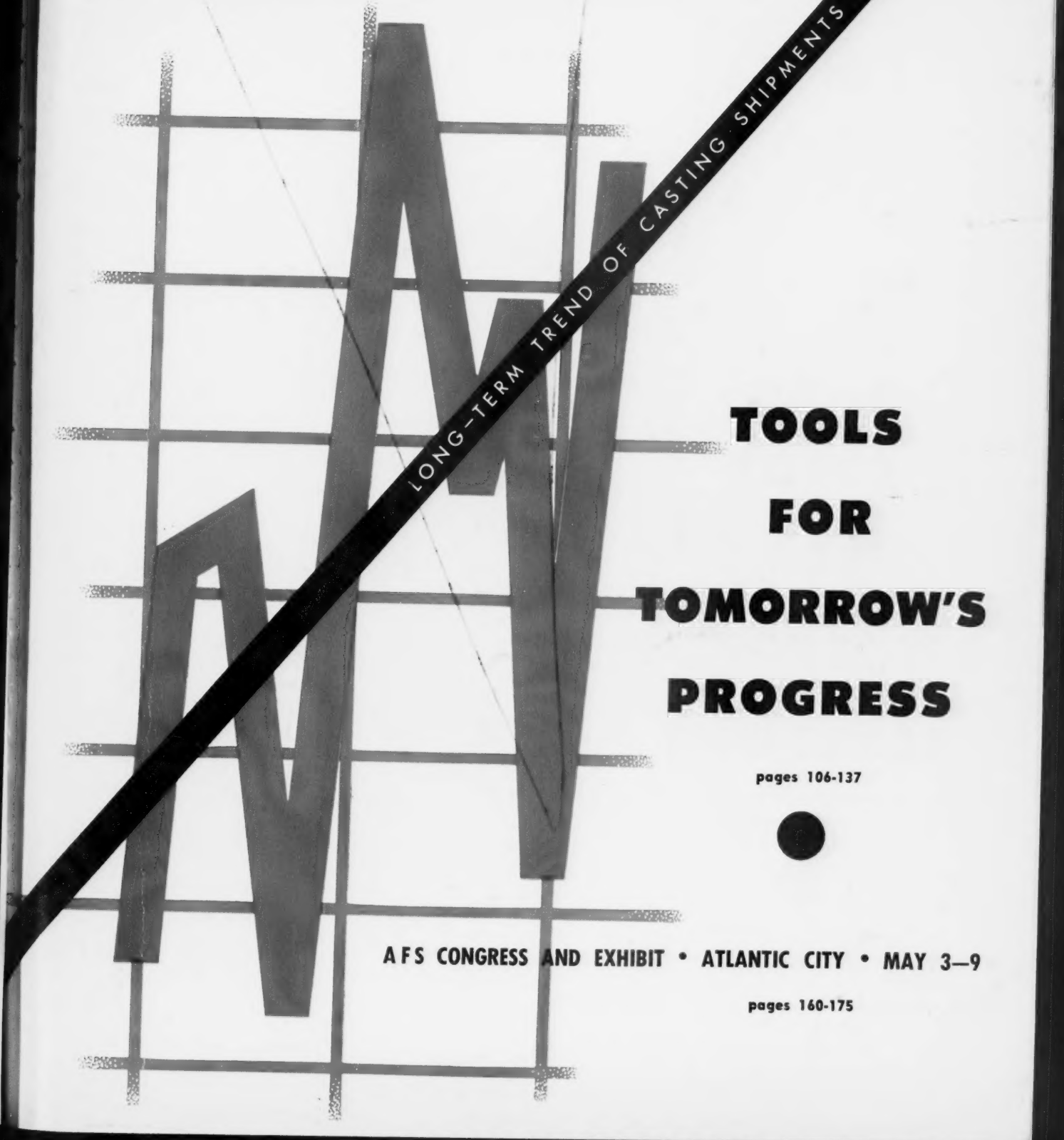
MAY 1956

# FOUNDRY

A PENTON PUBLICATION



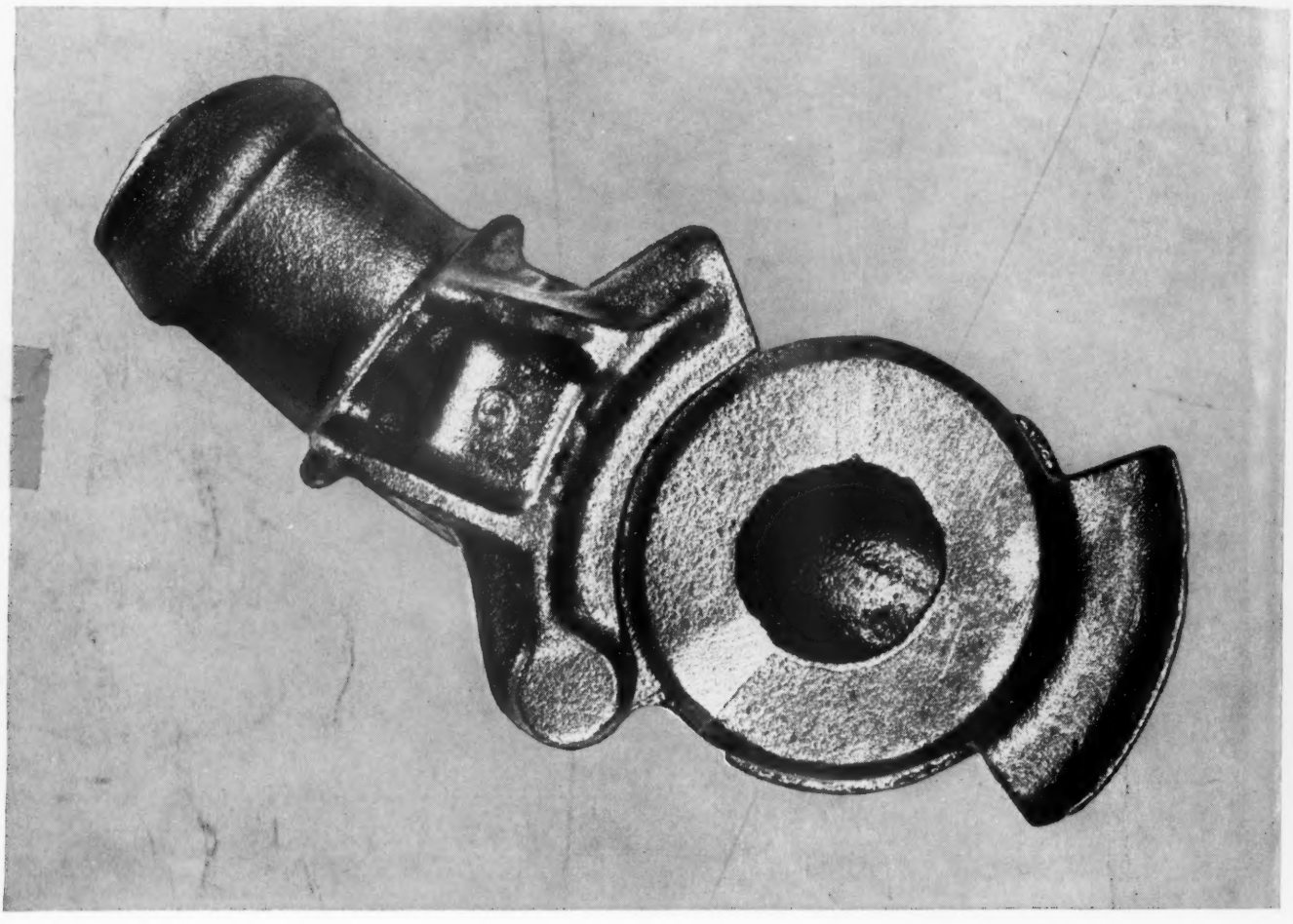

## TOOLS FOR TOMORROW'S PROGRESS

pages 106-137

AFS CONGRESS AND EXHIBIT • ATLANTIC CITY • MAY 3—9

pages 160-175

# Q. How can YOU make STRONGER GRAY IRON CASTINGS AT NO EXTRA COST?



# A. FERROCARBO® by CARBORUNDUM

REGISTERED TRADE MARK

**YOU CAN INCREASE** the tensile strength of castings for your customers as much as 2000 to 2500 pounds per square inch... when you treat your gray iron with FERROCARBO® in patented briquette form. These castings are finer-grained, denser, stronger... with greater resistance to wear and heat shock. And machining tests in eleven leading shops prove that castings of gray iron treated with FERROCARBO averaged 89.5% *greater machinability* per tool than untreated castings.

**YOU MAKE SAVINGS** in raw materials costs—while giving your customers these *premium* castings—because deoxidizing with FERROCARBO generally permits use of cheaper melting materials in the charge.

**OVER 600 LEADING FOUNDRIES** are now using FERROCARBO to produce superior castings—both gray iron and malleable. Are *you* among them?

**FREE BOOKLET...** gives instructions for use of FERROCARBO ...benefits, results. Write The Carborundum Company, Dept. F 84-61, Niagara Falls, New York.

**FERROCARBO® DISTRIBUTORS:**

**KERCHNER, MARSHALL & CO.**
PITTSBURGH • Cleveland • Buffalo
Philadelphia • Birmingham • Los Angeles

**MILLER & COMPANY**
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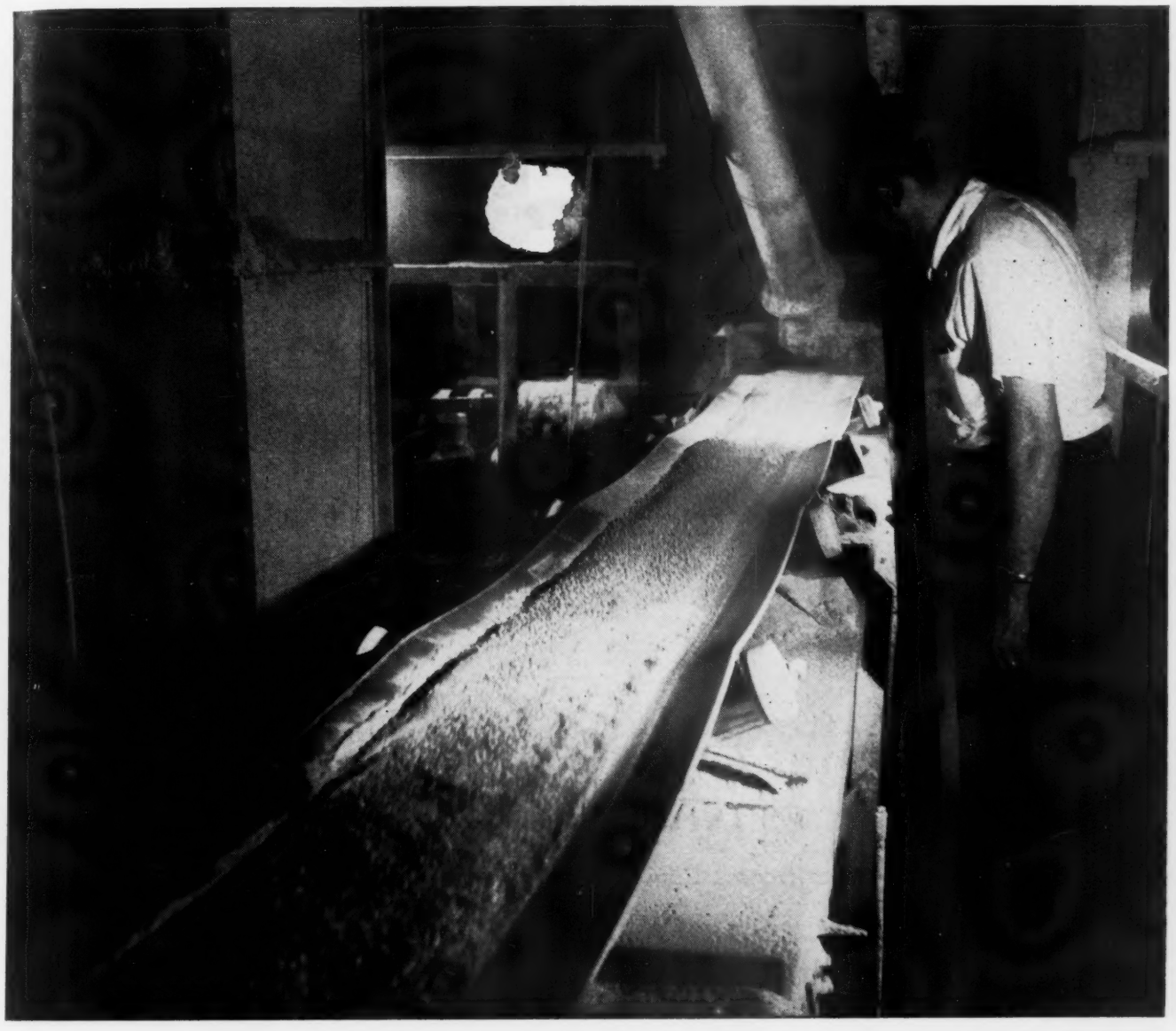
# B.F.Goodrich



# It used to burn up every 6 months

*A typical example of B. F. Goodrich improvement in rubber*

You could smell the belt burning, see the cracks in it. Limestone sand, to be used in making window glass, is heated to 300 degrees, then dumped onto a moving belt to be carried away from the furnace. But the sizzling heat burned out belts of almost every known make—they averaged only six months.

Then an engineer suggested a new, improved B. F. Goodrich hot-material belt, called Solarflex. It's made with a special kind of rubber that stays soft and pliable even at temperatures that cause other belts to harden and crack.

They fastened a length of the new B. F. Goodrich belting to the hot material belt you see here. The heat ruined the regular belt as usual—but not the Solarflex. It has now outlasted three standard hot-material belts, is still going strong after two years.

B. F. Goodrich conveyor belts invariably save money for users because they're engineered for the special jobs to be done. Some kinds of belts stand crashing blows, lasting far longer than others ever used to last. Some are made to handle wet, sticky or freezing materials without clogging pulleys. Some are made to carry packages and other things up very steep inclines. In fact, there's a B. F. Goodrich belt for almost every problem.

Call your B. F. Goodrich distributor for more information about any kind of belting, hose or other B. F. Goodrich rubber products. *The B. F. Goodrich Company, Dept. M-609, Akron 18, Ohio.*

**B.F.Goodrich**

**INDUSTRIAL PRODUCTS DIVISION**



*For more information, use Reader Service Card, page 347*

# FEDERAL GREEN BOND BENTONITE

*"the best of the bentonites"*

*and here's why . . .*

- LOW VISCOSITY★
- HIGH GREEN BOND STRENGTH
- HIGH DRY BOND STRENGTH
- Ph 9.0
- DEPENDABLE UNIFORMITY
- AVAILABLE IN PULVERIZED, GRANULAR AND SLURRY GRADES

★ Federal GREEN BOND'S low viscosity enables users to temper sand with less water, get optimum strength with less mulling time, when "dry ed-mixed" to sand. When used as a "slurry", up to 25% more GREEN BOND may be added to the water, to produce a more potent slurry and provide easier control of moisture and sand strength.

Write for your copy of "Tailor-Made Molding Sands".

EIGHTEEN
CONVENIENT SOURCES
*for*
IMMEDIATE DELIVERY

★ Federal warehouse
• Stocked by dealer

## THE FEDERAL FOUNDRY SUPPLY CO.

4600 EAST 71ST STREET · CLEVELAND 5, OHIO

FOUNDRY
A PENTON PUBLICATION

May 1956
Volume 84—Number 5

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Cleveland 13, Ohio
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(For addresses of branch offices, see page 437)

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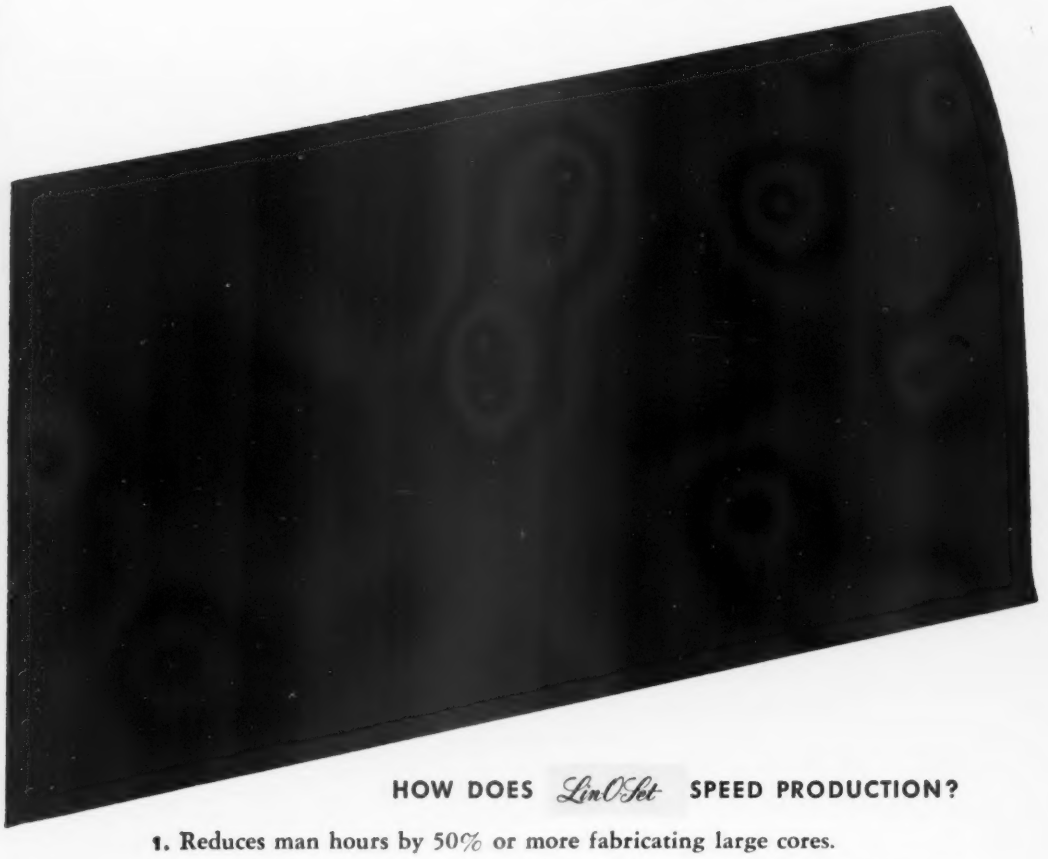
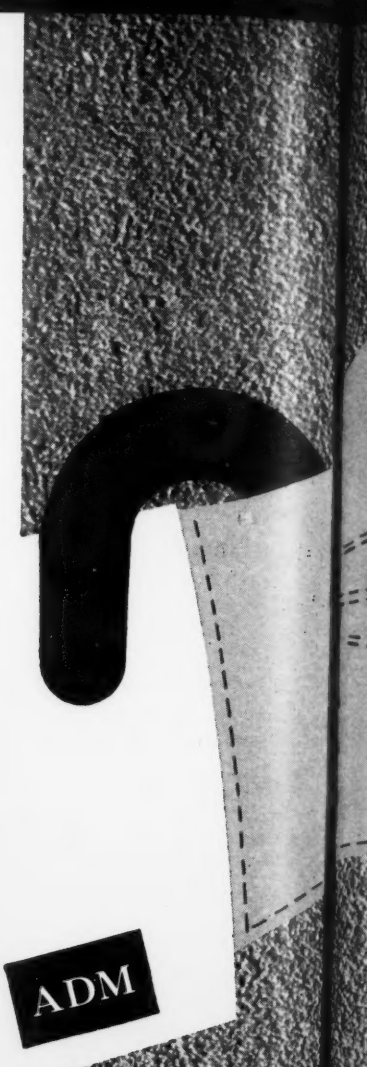
# ADM presents with pride the

# V.I.P.

## of core binders...






### HOW DOES *LinOSet* SPEED PRODUCTION?

1. Reduces man hours by 50% or more fabricating large cores.
2. Fewer rods are needed for reinforcement because LIN-O-SET cores are stronger before and after baking.
3. Average baking time is reduced by 30%.
4. Collapsible LIN-O-SET cores shake out like sugar . . . drastically reduce cleaning time.

### HOW DOES *LinOSet* IMPROVE CASTING QUALITY?

1. LIN-O-SET cores resist deformation during baking; maintain excellent dimensional stability; set up on contact with core box.
2. Sand systems are uncontaminated by LIN-O-SET.
3. LIN-O-SET cores improve casting finish.

### ANY OTHER *LinOSet* ADVANTAGES?

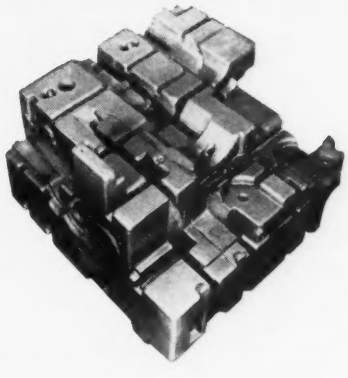
1. LIN-O-SET lets you accurately control set-up time regardless of operational or climatic conditions.
2. LIN-O-SET is immediately adaptable to practically all sand mixing procedures. No special measuring or mixing equipment needed.
3. LIN-O-SET cores do not produce toxic fumes or objectionable odors.
4. Normal wash procedures may be employed without damage to cores.
5. LIN-O-SET and LIN-O-SET bonded cores offer indefinite storage life.

# Lin-O-Set

✱ V.I.P. means very important product—very important to foundrymen looking for ways to cut costs. More than just another binder, LIN-O-SET is a *New Method* of core making designed especially for medium-to-heavy work and especially suited to jobbing foundries. A specialized quick curing core binder that "sets up" at room temperature, the purpose of LIN-O-SET is to speed production and improve casting quality.

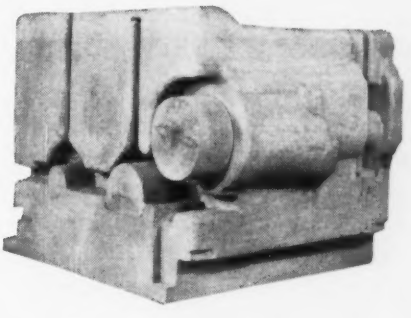
**SOME FOUNDRIES SAY:** "It's expensive *Not* to use new LIN-O-SET." For instance, these examples of heavy, intricate cores are produced in a comparatively short time and with no complications . . .

**AT ST. MARYS FOUNDRY CO., *St. Marys, Ohio:***



Intricate St. Marys core made with LIN-O-SET was used to produce a horizontal boring mill head weighing 2946 lbs. and measuring 31½" x 36" x 44". Ramming and finishing this core was regularly a 5¾ hour job. With LIN-O-SET it now takes only 1¼ hours . . . over 3 times as fast.

**AT STATE FOUNDRY CO., *Akron, Ohio:***



New LIN-O-SET core mix enabled State Foundry to fabricate this 1740 lb. core in 1¾ hours, a job which previously took 8 hours using conventional binder. This core, measuring 31" x 39" x 27", is used in producing a 62" vertical boring mill base.

**These cores may be seen at the 1956 AFS Castings Congress, Atlantic City—Booth 1636-38**

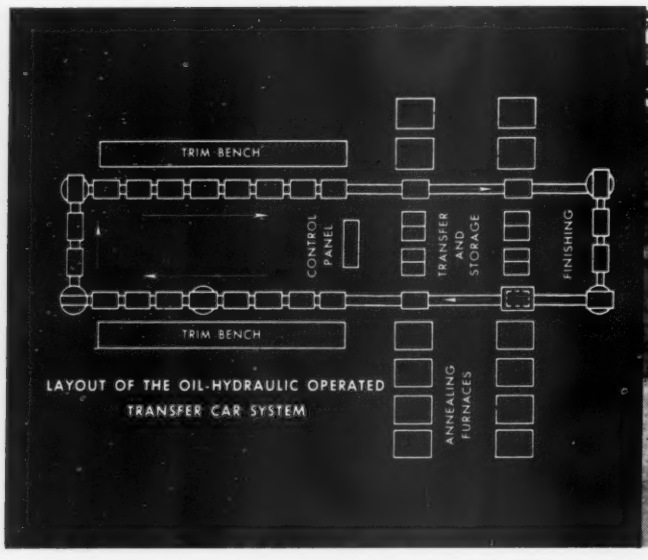
Archer · Daniels · Midland company

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110th ST., CLEVELAND 2, OHIO

**LINOIL** **INDUCTOL** **LIN-O-CEL** **FRE-FLO** **ADMIREZ** *Lin-O-Set*

# hydraulically-powered castings transfer system designed and built by **JEFFREY**

***makes the job easier, safer and more efficient***




**Transfer cars** make a 600-foot circuit in moving from trim benches to annealing furnaces to finishing and back at National Malleable & Steel Castings Co., Cleveland, Ohio.

**Transfer car on a turntable**

**27 shuttle cars,** each capable of handling a 6-ton load, carry castings around this circuit at most efficient speed and with a minimum of manual labor. The system's successful operation during the past two-and-a-half years is evidence of the wise engineering employed and sturdiness of the construction.

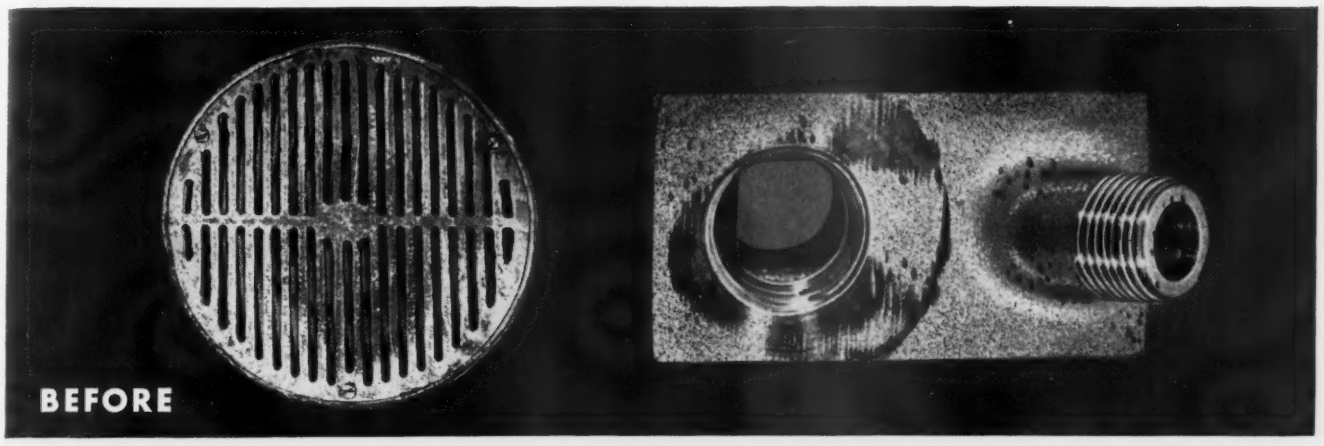
Many limiting conditions led Jeffrey and National Malleable to decide upon hydraulic equipment and drives underground, in a tunnel below the car tracks. The ten pushers on the straight-line movements and the five 10-foot turntables are powered by individual hydraulic units. In operation, cars advance one space every five minutes and turntables rotate to receive and discharge the cars.

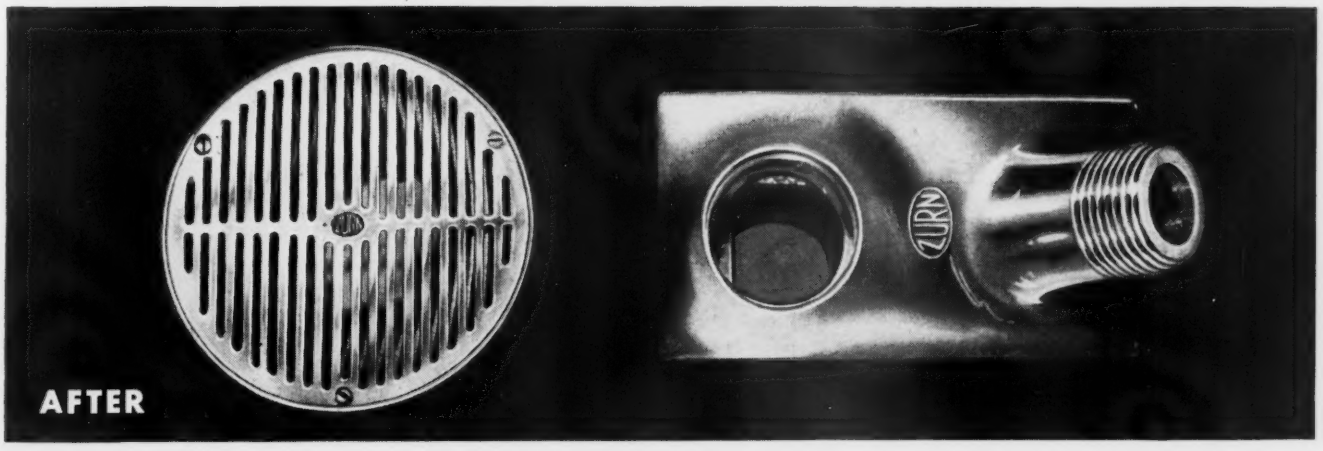
Jeffrey makes layouts of equipment and mechanizes complete foundries, or supplies individual pieces of equipment. Catalog 845 describes the services. The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

**CONVEYING • PROCESSING • MINING EQUIPMENT • TRANSMISSION MACHINERY • CONTRACT MANUFACTURING**

## 3M METHOD... *better from start to finish*




# Pennsylvania plant boosts production 50% to 100% with 3M Abrasive Belts

**3M Abrasive Belts** are long-lasting production tools designed to do the best grinding and finishing job at lowest cost to you.

**J. A. Zurn Mfg. Co., Erie, Pa., manufacturers of engineered plumbing drainage controls, formerly used set-up wheels for grinding and finishing the two cast parts shown above — Nickel Bronze® floor drain strainers and solid bronze wall-type hydrants. By switching to the 3M Abrasive Belt Method, this company obtained the following results:**

**Floor Drain Strainer** made of unusually tough self-polishing Nickel Bronze® alloy is rough-ground with a Grit #80 Three-M-ite Cloth Belt then polished with a Grit #180 Tri-M-ite Cloth Belt. This method increased production between 50% and 100% *and* saved the company nearly $3000 which they had formerly spent having the polishing done by an outside source.

**Wall-Type Hydrant** of solid bronze, is rough-ground with a Grit #80 and polished with a Grit #180 Tri-M-ite Cloth Belt then color-buffed. 3M Belts increased production over 50% and vastly improved the quality of the finished product.

3M Abrasive Belts can help you boost production, too. Your 3M Representative is an abrasives expert who can show you how the 3M Abrasive Belt Method can work best in your foundry. Call him today!

**WRITE TODAY,** on your letterhead, for free booklet on grinding of non-ferrous metals. Address: Minnesota Mining and Manufacturing Co., Dept. CN-56, St. Paul 6, Minnesota.

3M ABRASIVES

3M COMPANY

Made in U.S.A. by Minnesota Mining and Mfg. Co. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City. Makers of "Scotch" Brand Pressure-Sensitive Tapes, "Scotch" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

# HYSTER INDUSTRIAL TRUCKS ARE *BUILT* TO DO THE HEAVY WORK

The MATERIAL HANDLING INSTITUTE'S EXPOSITION
Cleveland, Ohio
PUBLIC AUDITORIUM
JUNE 5th THRU 8th
1956

**VISIT BOOTHS 1116 and 1422**

LP-Gas equipped ZA-80 using special fork attachment, places and removes castings from heat treating furnaces. Hot materials remain on truck and are lowered to water quench tank and then moved to storage, finishing section or shipping department.

Pictured above is one of many typical examples of how Hyster® Industrial Trucks are helping to effect tremendous savings in the cost of materials handling in Foundries.

Even if you are now using lift trucks or have never used industrial trucks of any kind, your Hyster dealer can show you how you can quickly realize more profit from your operation with these multi-purpose utility tools. Your Hyster dealer knows materials handling . . . he is an expert on the problems and their solution. He can help you with special techniques and cost reducing methods. Call him today...why not take advantage of his materials handling know-how?

## HYSTER DEALERS GIVE YOU ALL 3!

1. **PLANNING**—your Hyster Dealer will plan your materials handling operation from scratch, or will analyze your present system to see if it can be improved.
2. **THE RIGHT TRUCK**—for *your* job from Hyster's complete line of industrial trucks (1,000-30,000 lbs.) and over 100 job-attachments for economical load handling.
3. **THE RIGHT SERVICE**—ample spare parts stock, shop facilities, factory-trained mechanics and an efficient field service that keep your Hyster lift trucks going on your job, wherever your job might be located. Hyster trucks are noted the world over for their low downtime.

**Materials Handling Trucks from 1,000 to 30,000 pound capacities**

2902-30 N. E. CLACKAMAS, PORTLAND 8, OREGON
1010-30 MYERS STREET.....DANVILLE, ILLINOIS
HYSTER N.V. .....NIJMEGEN, THE NETHERLANDS
**FOUR FACTORIES:** Portland, Oregon; Danville, Illinois; Peoria, Illinois; Nijmegen, The Netherlands

HYSTER

**HYSTER COMPANY**

*now...*

**LINDBERG-**

**FISHER**

*Electric*

**RESISTANCE**

**FURNACE WITH...**

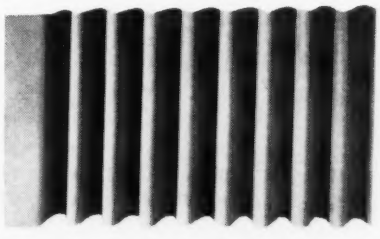
# CORRTHERM

## HEATING ELEMENT

For permanent mold, sand casting, and die casting of aluminum, magnesium, zinc and lead, Lindberg-Fisher now offers its improved Electric Resistance Furnace with the revolutionary new CORRTHERM Heating Element.

Lindberg-Fisher ER Furnaces have, time and again, meant lower cost per lb. of finished casting. And with practically indestructible CORRTHERM elements, lower furnace maintenance costs and longer crucible or pot service assure you of even greater savings.

These furnaces eliminate localized heating of metal, and gas absorption, because no products of combustion are present. No exhaust fumes or smoke means less operator fatigue and higher production. Investigate the advantages of this furnace. Write for Bulletin No. 321.



CORRTHERM elements are large sheets of nickel chromium. They are easy to install, just hang in furnace, and operate at extremely low voltages, completely eliminating shock or short hazards.

**See the Lindberg-Fisher Electric Resistance Furnace in operation at the Casting Congress and Exhibit in Atlantic City. We'll also be showing the new Lindberg-Fisher Electric Reverbatory Holding Furnace and Automatic Ladling Unit.**

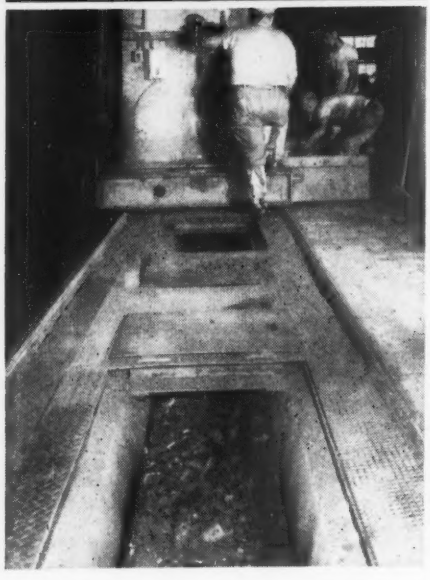
LINDBERG FISHER

**MELTING FURNACES**

*A Division of Lindberg Engineering Company*

2453 WEST HUBBARD STREET, CHICAGO 12, ILLINOIS

**This foundry DOUBLED BELT LIFE by switching to IMPERIAL**



**Long-wearing Imperial Belting gives maximum economy**

Sand and metal with temperatures up to 500° F. drop directly on an Imperial Stitched Canvas Super Insulated Sahara Conveyor Belt used in the foundry of Empire Steel Castings.

That's rugged service . . . with the belt subject to damage by tearing, heat, impact and abrasion. Yet the Imperial Belt used (217′ x 24″ x 6 ply, with armored reinforcement) has been in operation 24 hours a day since January, 1954. This is double the life of belting used previously, the foundry operators report.

Imperial Sahara Belting is job-designed to outwear any other belting made for foundry service . . . and thus give lowest ultimate belting cost. Write for informative Data Sheet 54-2 and describe your belting needs.

**Imperial BELTING CO.**

1755 S. Kilbourn Ave., Chicago 23, Ill.

*You expect MORE from Imperial . . . and you get MORE!*


# With the Editors

ATTENDANCE Looks Good: In just a few days a sizable segment of foundry management will visit Atlantic City to participate in the technical program and to view the exhibition at the 1956 AFS Castings Congress and Show. Reports from society headquarters in Chicago and from Wayne Stetson, manager of the Atlantic City Convention Bureau, indicate the attendance probably will exceed the big International Congress staged there in 1952.

—o—

**A Challenge:** The show, which will crowd the large convention hall, will include much that is new or improved in the fields of both foundry equipment and supplies. Some of these new and improved machines and materials are described in this issue, starting on page 342. It is probable that new processes, such as shell molding, which received such a heavy play at the last two shows, and the more recently introduced $CO_2$ process, will attract much attention. With labor becoming more expensive and, in times of good business, much harder to obtain, foundry show visitors will be interested in anything that helps solve the labor problem.

—o—

**FOUNDRY at the Show:** Of course, FOUNDRY will be there in full force to report the many events of the congress completely, also to man the FOUNDRY exhibit in Convention Hall and to see and visit with our many friends in the industry. The editorial staff assigned to cover the convention and, incidentally, enjoy a very long week-end at the seashore, include Frank G. Steinebach, William G. Gude, Robert H. Herrmann, Edwin Bremer, Jack C. Miske, Kenneth L. Mountain, Harry L. Richey, Virginia C. Taylor and Virginia B. Harms of Cleveland, and Erle F. Ross of Chicago.

The business department will be represented by George A. Pope, David D. Gibbs, A. L. Klingeman, Earl H. Thomas, Mary Jane Kimpel, Dolores Brant, Bettie Cook and Jeanne Franklin from Cleveland; J. F. Ahrens and J. L. Ozanne of New York; and A. W. Johansen and L. R. Hetke of Chicago.

Rand Ebersole again will be in charge of the FOUNDRY booth, No. 1512. Drop in, rest a while and visit.

—o—

**Third Time:** This is the third time in 41 years that the society has met in Atlantic City. The first meeting, which included sessions of the American Foundrymen's Association and the American Institute of Metals, provided a technical program of 63 papers and reports. FOUNDRY, in its September 1915 issue, reported that "the 10th annual foundry and machine exhibition, under the auspices of the Foundry & Machine Exhibition Co., will open Saturday morning, Sept. 25 and close Friday evening, Oct. 1. The exhibition will be held on Young's Million Dollar Pier."

The difference in tempo between the convention today and those 40 years ago is to be found in the following sentence from the report in the October 1915 issue: "The evenings, with exception of Wednesday, when the annual business session of the American Foundrymen's Association took place, were devoted to entertainment and recreation."

Foundrymen met again in Atlantic City when the AFS staged the 1952 International Foundry Congress and Show there. Approximately 13,000 visitors from the United States and Canada and 225 from 30 foreign countries were treated to "a spectacular display of new and improved equipment and supplies and a technical program replete with informative data of both a practical and theoretical nature." The largest AFS banquet in history, with 1175 present, provided the high light of the social features of the congress.

Yes, it was a great convention in 1952. But the 1956 edition should be even better, with one possible exception. We will miss many of the fine friends from overseas.

—o—

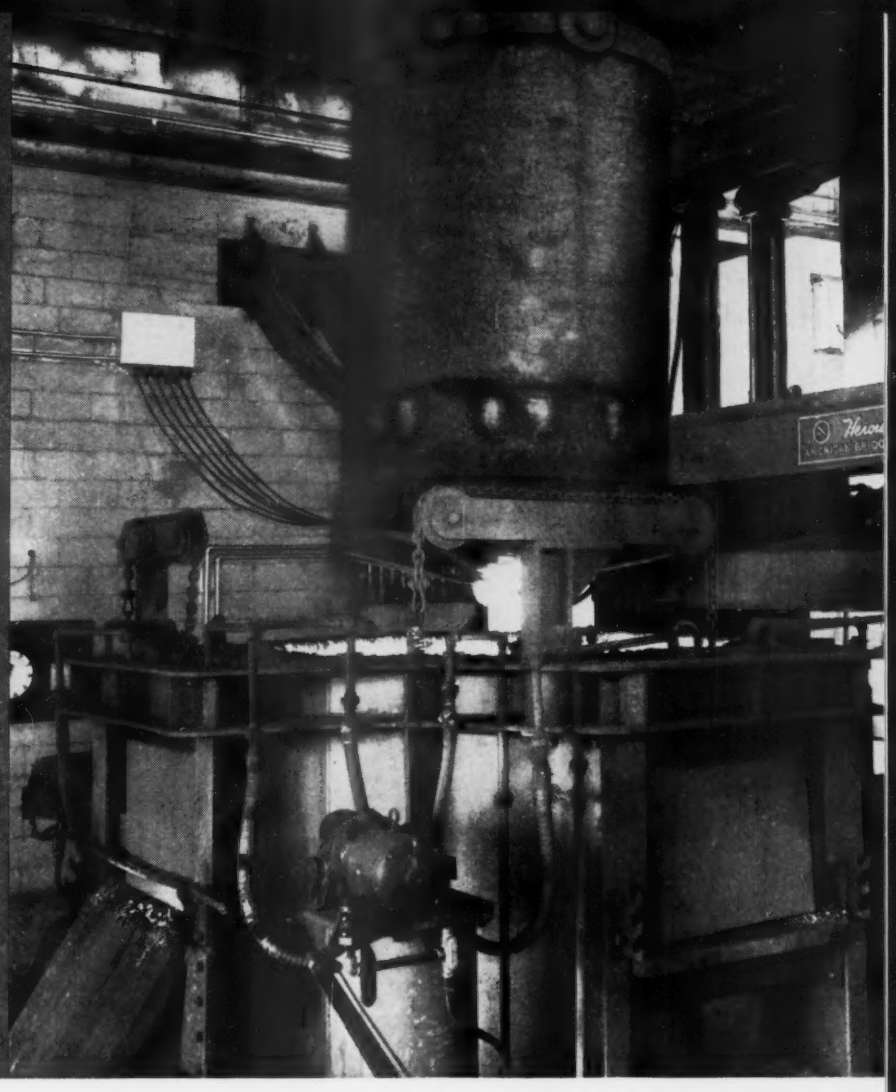
**Public Relations:** The February issue of *The Crucible,* published by the Non-Ferrous Founders' Society, carries an interesting comment on community relations which should be read by every operator of a foundry. The comment is as follows:

**COMMUNITY RELATIONS AFFECT EMPLOYEES, TOO!**

Every man has—or wants to have—a pride in his job. Not simply in the manner of doing it, but also in the mere fact of his employment. Every employer should ask himself what happens in the mind of his employee when friends ask—"Where do you work?"

Community relations have a strong bearing on employee relations. When your firm does something constructive for the community in which you operate, don't keep it a secret, at least from your employees. Give them something to brag about, too. You'll find that the ability to say, "My firm helped on that Day Camp project," or "My outfit just donated a resuscitator to the local rescue squad" actually expands your gift. It permits your employee to feel that he too shared in the

# The Heroult ELECTRIC FURNACE



## . . . an excellent and economical producing unit for the small foundry!

In these days of keener competition, it behooves you to weigh every possibility for improving your output, and the quality of your product. *A better, faster method of melting may be the answer to your problem.*

In the small steel foundry, as well as in the iron foundry, where a high grade product is demanded, the Heroult Electric Melting Furnace has proved to be an excellent and economical producing unit.

The Heroult is the safest, most dependable electric furnace on the market. Available in foundry sizes with either Gantry or swing-type roof, the Heroult is equipped with the latest time and labor-saving mechanical devices and electrical controls. It is noted for its efficient performance, simplified operation, and low operating and maintenance costs.

We welcome an opportunity to help you determine how you can use this modern electric furnace in your shop. An inquiry will receive the prompt and careful attention of our furnace engineers.

**AMERICAN BRIDGE DIVISION**
**UNITED STATES STEEL CORPORATION**
**GENERAL OFFICES: 525 WILLIAM PENN PLACE, PITTSBURGH, PA.**
Contracting Offices in New York, Philadelphia, Chicago,
San Francisco and other principal cities.
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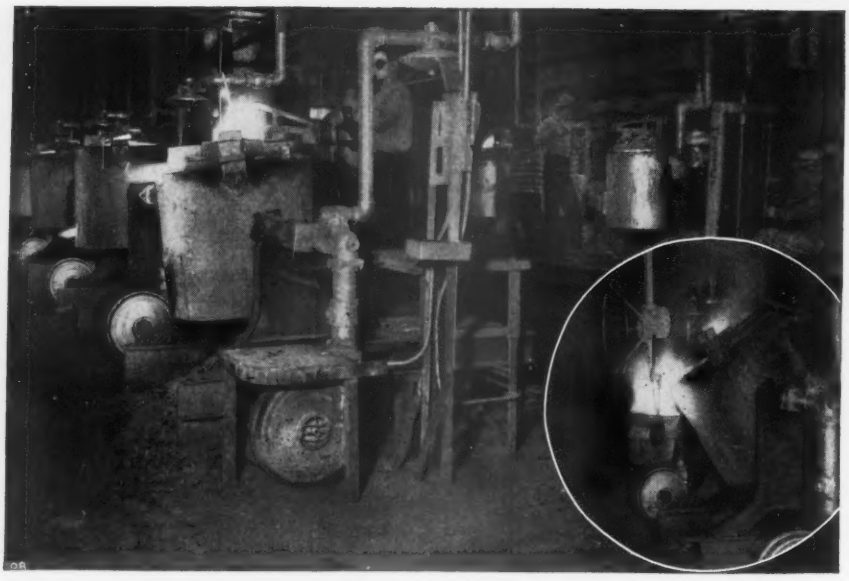
USS

**SEE THE UNITED STATES STEEL HOUR.** It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL



***do's and don'ts of good melting practice AT MAY CASTINGS CONGRESS***

- Get your copy of *The Do's and Don'ts of Good Melting Practice for Non-Ferrous Foundries* in Booths 2101-03 at the May Castings Congress and Show, Atlantic City.
- Our exhibit will not only show representative crucible melting furnaces for non-ferrous metals ...gas and oil fired...but will present an educational effort which we hope you will find constructive.
- Write for our recommendations for *Hausfeld* Furnaces to cut your present melting costs and for bulletins on any non-ferrous melting job to THE CAMPBELL-HAUSFELD CO., 300-320 Moore Street, Harrison, Ohio.

**Hausfeld**

METAL MELTING FURNACES

giving. It results in pride of employment. It makes better employees in the bargain.

Community relations need not be too far-flung or extravagant. Almost every firm in the industry contributes its share to the betterment of community life. Too many of us fail to let our employees share in the giving. When we think of them, not as employees, but as citizens, parents and taxpayers, we begin to see why they *want* to know what we're doing for their churches, their PTA's, their youth recreation projects and their Chamber of Commerce.

If you haven't a company house organ, try the simpler expedient of a little printed slip in payroll envelopes at least once a month. Or a bulletin board that keeps employees advised of company activities in your town's interest. Don't divorce your employee relations from your community relations. They're part and parcel of the same problem.

—o—

**A Hassle:** A few weeks ago when I visited Syracuse to talk to the Central New York Chapter of AFS, I found the local newspapers playing up a story about the school board of Solvay, a suburb. It seems that many in the town got into the hassle as to whether the board should renew 116 subscriptions to the *New York Times,* subscriptions actually paid for by the students. Pressure was applied and 100 citizens attended the board meeting when the matter came to a vote.

Since then I have been trying to figure out how I can generate such rabid enthusiasm over renewing subscriptions to my favorite business publication.

—o—

**Pangborn Hall:** I have received the March number of *Notre Dame,* a magazine of the University of Notre Dame, which carries a story of the recent dedication of Pangborn Hall, Notre Dame's newest residence hall. The building was built at a cost of $800,000, a gift, through the Pangborn Foundation, of Thomas W. Pangborn, president, and John C. Pangborn first vice president, Pangborn Corp., Hagerstown, Md. Pangborn Hall will accommodate 200 students who formerly lived off campus. It has a chapel, lounge and all modern facilities for study and comfort. The Rev. Theodore M. Hesburgh, in expressing the gratitude of the university for this new building, called it a "magnificent gift."

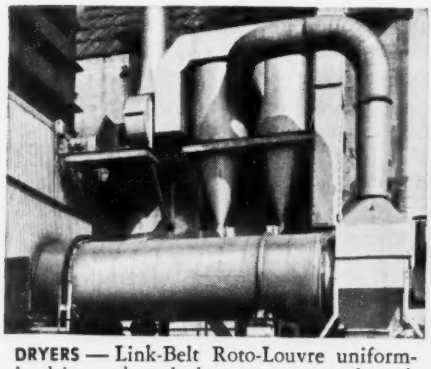
Last year Tom and John Pangborn completed a similar residence hall at Mount Saint Mary's College, Emmitsburg, Md., which cost $400,000 and accommodates 100 students.

Another Pangborn gift will be in evidence at Atlantic City when the first Pangborn medal will be awarded. The recipient is Prof. Charles C. Sigerfoos of Michigan State University.

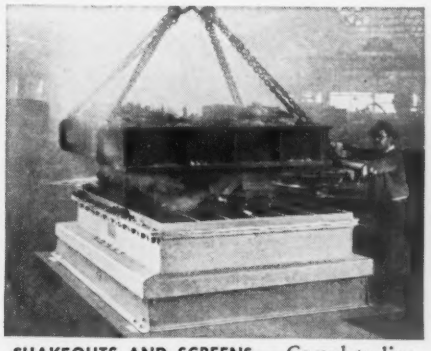
My sincere congratulations to Tom and John for these and numerous other gifts which will be enjoyed by many people for years to come.

F.G.S.

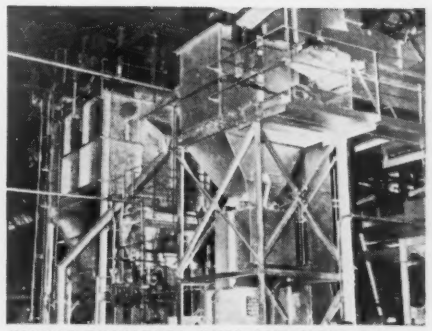
# For handling sand and castings--



**DRYERS** — Link-Belt Roto-Louvre uniformly dries and cools large tonnages of sand. Floor space is conserved because no extra cooler is required.

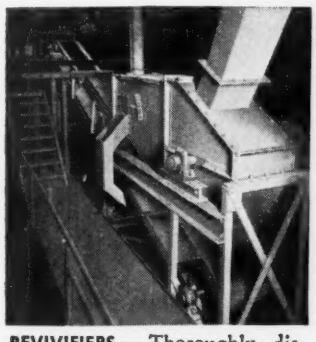


**SHAKEOUTS AND SCREENS** — Complete line provides centralized separation of sand and castings or sand screening for every type and size foundry.



**BUCKET ELEVATORS, BINS AND HOPPERS** — Low-cost elevating and storage of sand. Sturdily built in a wide range of types and sizes.

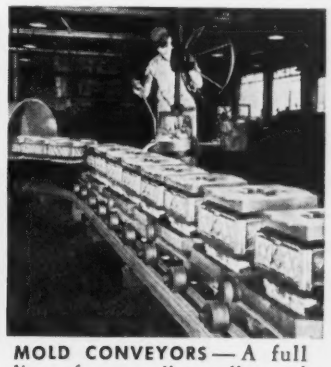
# LINK-BELT quality equipment...



**REVIVIFIERS** — Thoroughly disintegrate, blend, cool molding sand so it will ram to uniform density. Also remove shot.

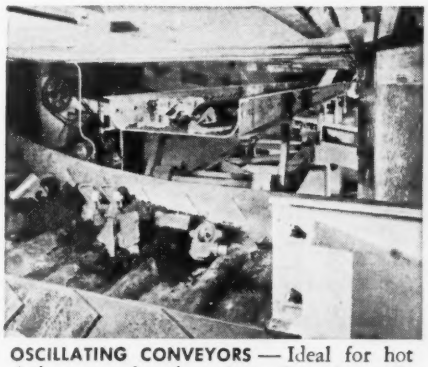
**BELT CONVEYORS** — Flat belt has plows to distribute sand to molders' hoppers. Troughed type used for other sand handling.

**SHELL MOLDING SYSTEM** for automatic, high-volume production of precision castings requiring little or no machining.

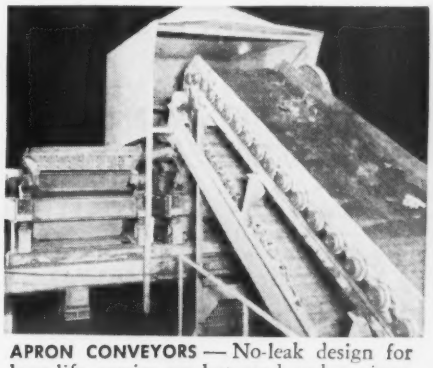


**MOLD CONVEYORS** — A full line of car, pallet, roller and trolley types meets all variations of foundry practice.

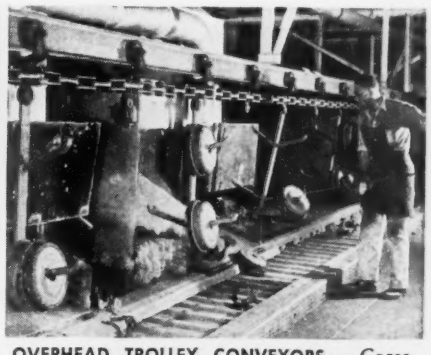
# cuts your costs every step of the way



**OSCILLATING CONVEYORS** — Ideal for hot shakeout sand and castings. One-piece, all-metal trough eliminates wear, leakage. With screened trough section, acts as shakeout.



**APRON CONVEYORS** — No-leak design for long-life service on hot sand and castings. Operates in horizontal or steeply inclined paths. Also good as sorting conveyor.



**OVERHEAD TROLLEY CONVEYORS** — Cores, molds and castings are economically handled. Complete flexibility of path and capacity provided plus saving of floor space.

Ask your nearest Link-Belt office for new Book 2423. It shows Link-Belt's complete line of modern equipment for ferrous and non-ferrous foundries plus 7 tested layouts.

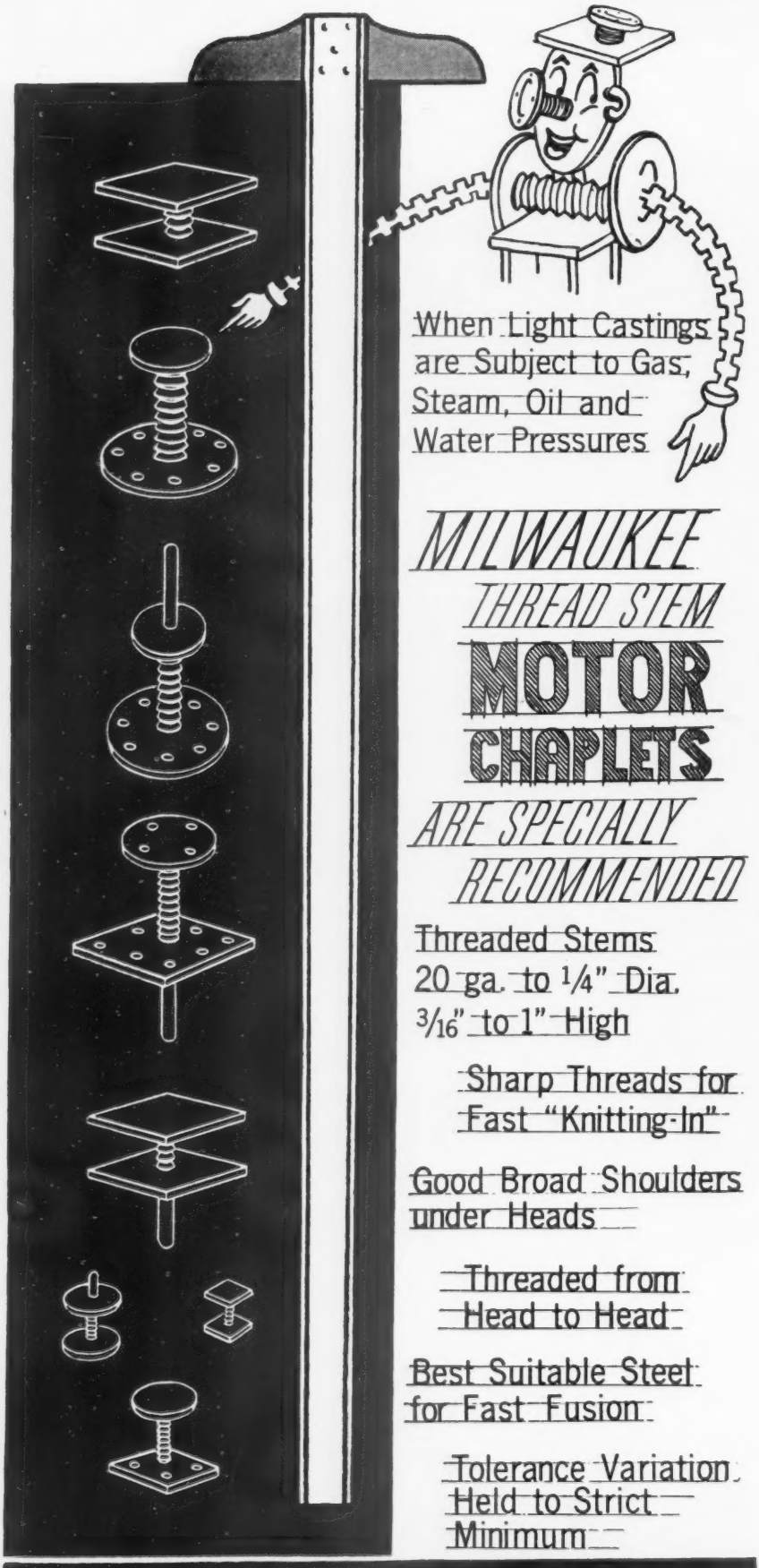
LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

MEMBER FEMA

**LINK-BELT COMPANY:** Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

13,967



When Light Castings are Subject to Gas, Steam, Oil and Water Pressures

MILWAUKEE THREAD STEM MOTOR CHAPLETS ARE SPECIALLY RECOMMENDED

Threaded Stems 20 ga. to 1/4" Dia. 3/16" to 1" High

Sharp Threads for Fast "Knitting-In"

Good Broad Shoulders under Heads

Threaded from Head to Head

Best Suitable Steel for Fast Fusion

Tolerance Variation Held to Strict Minimum

**Milwaukee Chaplet & Mfg. Co.**

1025 SOUTH 40th STREET • MILWAUKEE 46, WISCONSIN


# Calendar of MEETINGS

**May 3—Non-Ferrous Founders' Society,** annual business meeting, dinner and reception, Marlborough-Blenheim Hotel, Atlantic City, N. J.

**May 3-9—American Foundrymen's Society,** annual convention and exhibition, Convention Hall, Atlantic City, N. J.

**May 9-11—American Welding Society,** spring meeting and 4th welding and allied industry exposition, Buffalo.

**May 9-11—Investment Casting Institute,** annual spring meeting, Hotel New Yorker, N. Y.

**May 10-11—Refractories Institute,** annual meeting, Grand Hotel, Point Clear, Ala.

**May 14-17—Design Engineering Show and Conference,** Convention Hall, Philadelphia.

**May 17-18—Society for Advancement of Management,** material handling conference, Hotel Statler, New York.

**May 18-19—Gray Iron Founders' Society,** regional management conference, Rickey's Studio Club, Palo Alto, Calif.

**May 20-23—Industrial Heating Equipment Association,** spring meeting, The Homestead, Hot Springs, Va.

**May 24-25—Gray Iron Founders' Society,** regional management conference, Hotel Van Norman, Fort Wayne, Ind.

**May 24-25—Malleable Founders' Society,** technical and operating conference, Wade Park Manor Hotel, Cleveland.

**June 5-8—Material Handling Institute,** exposition, Cleveland Public Auditorium, Cleveland.

**June 11-12—Malleable Founders' Society,** general meeting, The Homestead, Hot Springs, Va.

**June 17-22 — American Society for Testing Materials,** annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

**June 24-26—Alloy Casting Institute,** annual meeting, The Homestead, Hot Springs, Va.

**July 17-30—Materials Handling Training Conference,** Lake Placid, N. Y.

**Sept. 1-9—Association of German Foundrymen.** International foundry exhibition and trade fair, Dusseldorf, Germany.

**Sept. 11-13—American Die Casting Institute,** annual meeting, Edgewater Beach Hotel, Chicago.

**Sept. 17-21—Instrument Society of America,** instrument-automation conference and exhibit, Coliseum Bldg., New York.

**Sept. 24-25—Steel Founders' Society of America,** annual fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

**Sept. 24-26—Material Handling Institute,** fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

**Sept. 25-28—Association of Iron and Steel Engineers,** iron and steel exposition, Public Auditorium, Cleveland.

**Oct. 4-5—Magnesium Association,** annual meeting, Drake Hotel, Chicago.

**Oct. 8-12—American Society for Metals,** national metals congress and exposition, Public Auditorium, Cleveland.

**Oct. 11-12—Armour Research Foundation,** national noise abatement symposium, Hotel Sherman, Chicago.

**Oct. 11-12—National Foundry Association,** annual meeting, Sheraton-Cadillac Hotel, Detroit.

**Oct. 18-20—Foundry Equipment Manufacturer's Association,** annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

**Oct. 20-23—Conveyor Equipment Manufacturer's Association,** annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

**Oct. 29-30—Refractories Institute,** fall meeting, The Homestead, Hot Springs, Va.

**Oct. 30-Nov. 2—Gray Iron Founders' Society,** annual meeting, The Homestead, Hot Springs, Va.

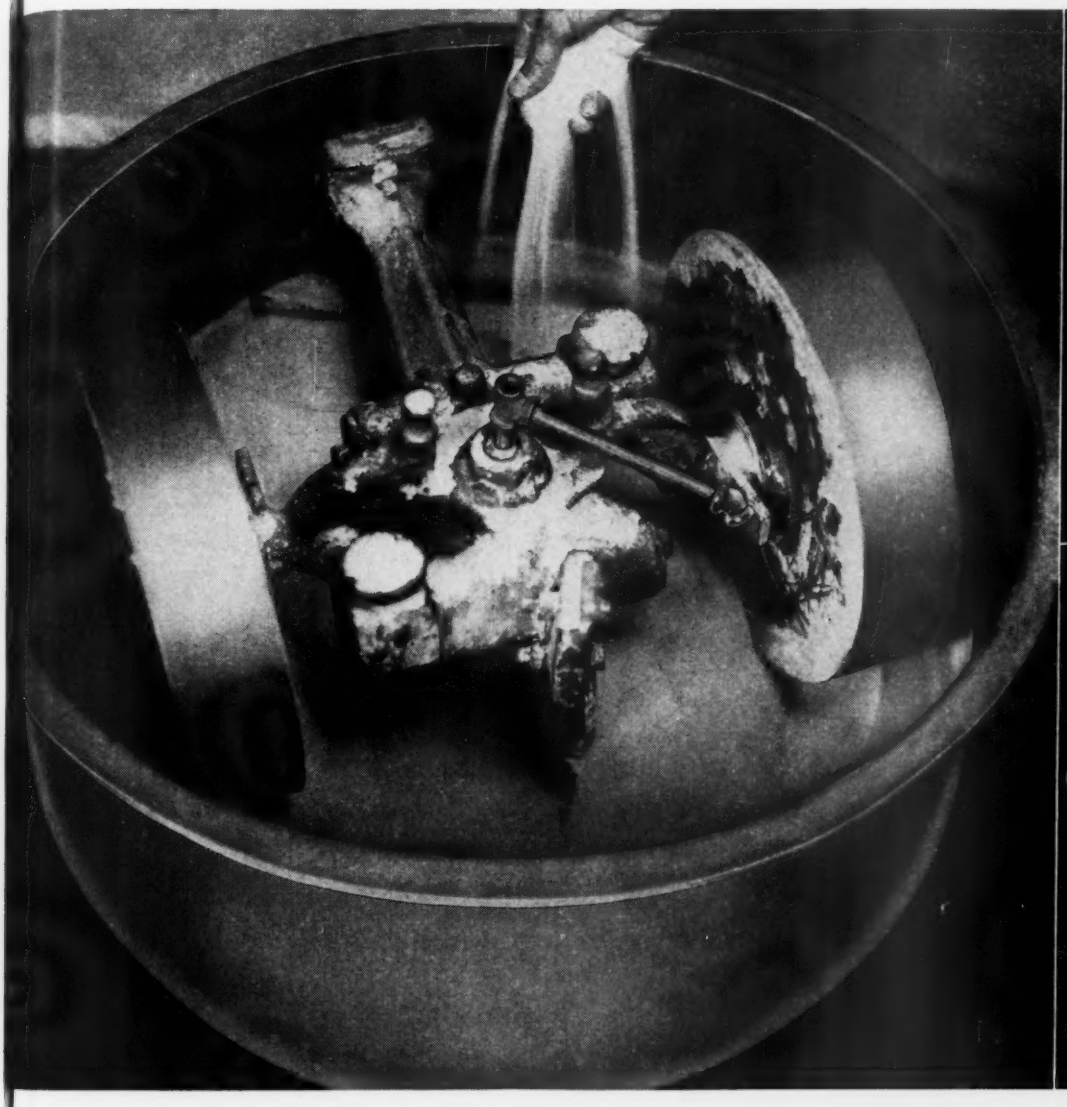
**Oct. 31-Nov. 1-2—Industrial Management Society,** time and motion study and management clinic, Hotel Sherman, Chicago.

**Nov. 8-9—All-Canadian Foundry Conference,** sponsored by Eastern Canada, Ontario and British Columbia chapters of AFS, Sheraton-Mount Royal Hotel, Montreal.

**Nov. 29-30—Michigan Regional Foundry Conference,** Union Bldg., University of Michigan Ann Arbor, Mich.

# New RESINOX* Cold Coating Resins–

## *free-flowing, non-dusting, easy-mixing!*



## *Monsanto's improved phenolic resins for shell molds and cores eliminate caking problems of stored coating sands!*

Field-test reports are coming in. Foundry men state that use of Resinox Cold Coating Resins is stepping up the efficiency of their shell molding operations.

The improved Resinox formulations, developed in Monsanto's Foundry Research Laboratory, are demonstrating outstanding free-flowing and non-dusting characteristics. Mixing time is reduced for either dump box or blowing equipment. No caking problems are encountered under normal storage conditions.

With Resinox Cold Coating Resins you can simplify your coating cycle. Conventional mixing equipment as well as specially designed mixers can be used. The resultant resin coating on each sand particle enables smaller amounts of resin to achieve the required strength properties in shell molds and cores.

Castings produced with these shells require little or no machining. Edges are clean and sharp. Intricate detail is maintained.

Because the economy and efficiency of shell molding depends so much on the quality of the resin used, it will pay you to get specific information on this new development. Send for data sheets and literature on new Resinox Cold Coating Resins. Write Monsanto Chemical Company, Plastics Division, Room 450, Springfield 2, Mass.

*See the Monsanto Exhibit*
*AFS Convention, Atlantic City*
*May 3-9*
*Booths 1825 and 1827*

MONSANTO

*Resinox Reg. U. S. Pat. Off.

This Westinghouse Air Compressor is an automatic door opener. It also supplies air for drying sterilized glassware.

# *Open Sesame*

## ...the magic flexibility of air power supplied by Westinghouse Air Compressors, opens the door to greater efficiency, lower costs

The usefulness of compressed air is little short of amazing. It opens doors, inflates tires, paints equipment, runs punch presses, operates hoists and myriads of pneumatic tools that multiply a worker's productivity.

There are many more uses, but they all add up to lower costs. That's why the source of your air power is so important. It must be dependable to produce maximum savings — it should be a Westinghouse Compressor. Here are a few reasons why:

**Low oil-level protection** — your Westinghouse won't pump air if the oil-level or oil pressure is too low. You never get repair bills for lack of lubrication.

**Automotive-type lubrication** — constant pressure principle forces oil to every moving part for longer life.

**Single- and two-stage, air-cooled design** — provide air at maximum efficiency. Cost less to operate.

**Starting unloader** — keeps compressor unloaded until motor reaches normal speed and oil circulation starts.

**Thermal overload protection** — cuts current if motor should overheat or if line voltage should drop.

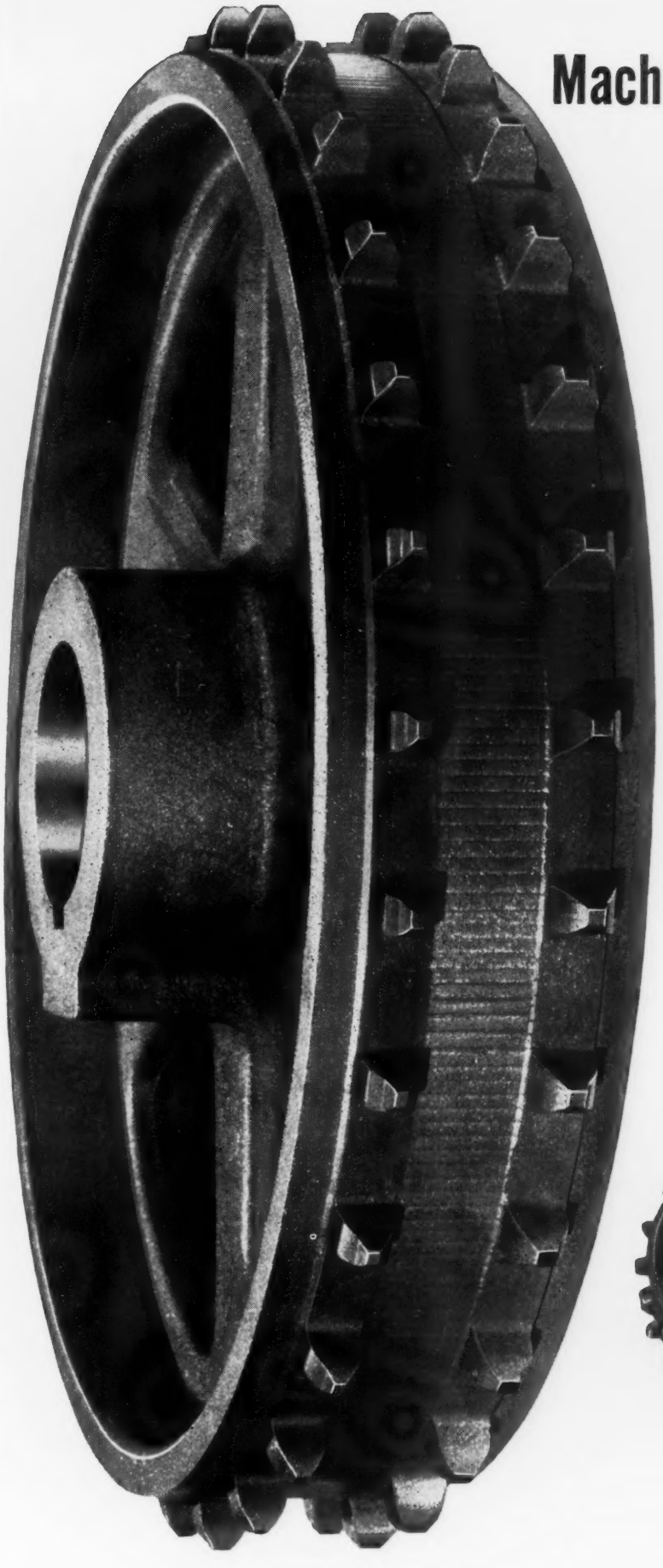
Open the door to lower costs with dependable air power. Insist on Westinghouse Air Compressors in your plant. Sizes up to 40 hp. Write for latest literature.

W-104

**LE ROI** *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS | TRACTAIR | STATIONARY AIR COMPRESSORS | AIR TOOLS | ENGINES



# Machining these teeth 100% eliminated by shell molding with Plenco resins

**Tensile strength increased over results obtained by former casting method**

These three ductile iron conveyor drive sprockets were shell molded by Woodruff & Edwards, Inc., Elgin, Ill., a general foundry which has pioneered in this new process.

Through the use of quality Plenco Phenolic Shell Molding Resins, the foundry has effected a notable product improvement. Previously a malleable gray iron blank was cast, requiring the teeth to be completely machined on. Shell molding also allows Woodruff & Edwards to replace gray iron with tougher, more flexible ductile iron, which has greater tensile strength.

Machining of the sprocket teeth (shown nearly actual size at the left) has been eliminated, and the only machining necessary is a reaming of the center bore and removal of the gating ring. Not only are the shell-cast teeth stronger, but the sprockets are produced with savings in labor and material.

We'll be pleased to consult with you on the use of Plenco shell molding compounds in *your* production.

Sprockets are approximately 11, 7, and 4" in diameter and weigh 25, 14 and 8 pounds respectively. All have teeth identical in size.

**PLASTICS ENGINEERING COMPANY**
Sheboygan, Wisconsin

PLENCO PHENOLICS
FOR BETTER PLASTIC PRODUCTS

See the Plenco exhibit
7th NATIONAL PLASTICS EXPOSITION
New York Coliseum, June 11-15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# ELECTROMET
# Supplies the Iron Foundry with Alloys for all Purposes

ELECTROMET offers you ladle or cupola addition agents for any of your foundry needs. Additions of ferro-alloys will adjust the composition of the base iron to make it suitable for the particular work on hand. You can reduce chill in thin-sectioned castings or improve strength and machinability. You can, if desired, increase hardness and improve resistance to wear and heat—all through simple additions of alloys. There is a wide variety of ELECTROMET alloys from which to choose.

ELECTROMET not only has the alloys to meet your needs, but also furnishes technical assistance in their use. Please phone or write the ELECTROMET office nearest you for detailed information on these or other ELECTROMET products.

## ALLOYS FOR LADLE ADDITIONS

**Ferrosilicons** (50%, 75%, 85%, and 90%) In grades and sizes suitable for all conditions in the iron foundry. Silicon reduces chill in thin-section gray iron castings.

**"SMZ" Alloy** — A strong, super-graphitizing alloy and chill reducer. Contains zirconium and manganese to enhance the inoculating properties.

**Calcium-Silicon**—Inoculant for reduction of chill and for developing high-tensile strength. Especially suited for use in low carbon-equivalent irons.

**Zirconium Alloys (12 to 15% and 35 to 40%)** Graphitizers for reducing chill, aiding machinability, and improving tensile properties.

**Ferrochromium Alloys** — Available in many grades for cast iron. All grades have rapid solubility. Widely used to improve the hardness, strength, and heat and wear resistance of cast iron.

**Ferrovanadium** — ELECTROMET foundry grade ferrovanadium has good solubility. Vanadium improves toughness.

## FOR CUPOLA ADDITIONS

**"EM" Briquets** — For adding chromium, manganese, silicon or zirconium to cast iron. "EM" briquets are scientifically designed for maximum alloy recovery in cupola melting.

**Visit our Exhibit**
**Booth 1635**
at the FOUNDRY SHOW
Atlantic City, N. J.
**May 3 through 9, 1956**

50th Anniversary
HALF A CENTURY OF DEVELOPMENT IN FERRO-ALLOYS AND METALS
Electromet
1906 ··· 1956

**ELECTRO METALLURGICAL COMPANY**
A Division of Union Carbide and Carbon Corporation
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OFFICES: Birmingham · Chicago · Cleveland · Detroit
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In Canada: Electro Metallurgical Company,
Division of Union Carbide Canada Limited, Welland, Ontario

The terms "Electromet," "EM" and "SMZ" are registered trade-marks of Union Carbide and Carbon Corporation.

When the name is STANDARD SILICA COMPANY, it means everything that's important to your product quality and customer satisfaction. For Standard produces the foundryman's most basic reproduction tool—silica sand. Our name bears this proud mark of approval by the industry because Standard means greatest silica purity and uniformity.

When your mixing formula starts with Standard foundry sand, you always begin with the same *known* quantity, a silica sand that tests 99.7% pure! The result is better molds and cores, better castings, less rejects, less cleanup time. All of which means a more profitable operation for you.

Next time, specify STANDARD when you need silica. It's a name you can rely on.

*It costs less to use the best!*

BLACKHAWK SILICA SAND

. . . so be sure to specify Blackhawk Silica Sand when you order. Prompt delivery is assured by two major trunk line railways.

**STANDARD**
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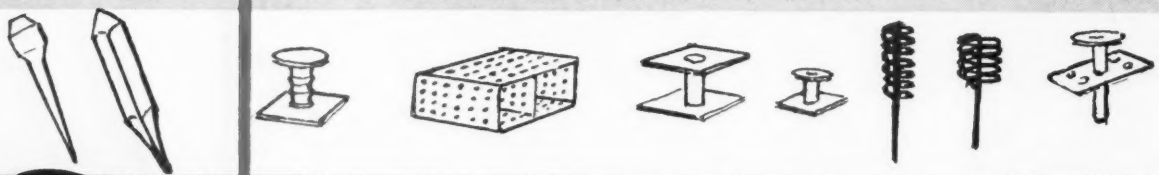
STANDARD SILICA COMPANY

*Silica Center of the World*


For more information, use Reader Service Card, page 347

# only the fine FANNER line offers



# ALL types of chaplets and chills

# for every casting need!

**See them at Booth 417, AFS Convention • Atlantic City, May 3-9, 1956**

Only FANNER, the world's largest manufacturer of chaplets and chills, can offer a *complete* line for *every* casting need. Almost 60 years of sound, basic chaplet and chill designing for specific applications plus metallurgically correct materials have made FANNER the "standard of the industry". All fine FANNER chaplets and chills are precision engineered and manufactured to tolerances of ±.002 to insure better castings with less labor and less scrap. From the great range of fine FANNER chaplets and chills stocked for your convenience, you can choose the exact product to fit your needs. As a result, you benefit three ways when you standardize on FANNER — in delivery, in production, and in lower costs!

***Write for our Chaplet and Chill Catalogs — they are the authority of the industry.***

• Qualified and specialized engineers in FANNER's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and nonferrous castings. Take advantage of the research and development work that FANNER has invested in this field to improve your profit picture. Simply direct your request to the address shown below.

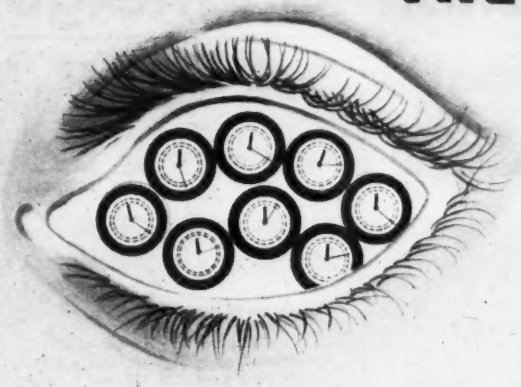
**THE FANNER MANUFACTURING COMPANY**

***Designers and Manufacturers of Fine Fanner Chaplets and Chills***

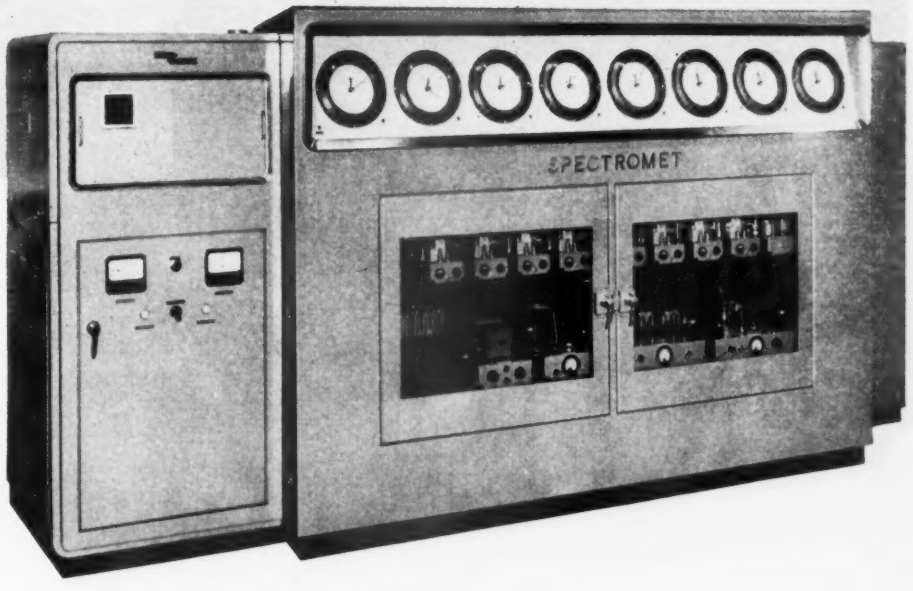
**BROOKSIDE PARK CLEVELAND 9, OHIO**

# the SPECTROMET*

by BAIRD



## metal analysis on the foundry floor




### FEATURES

- Complete analysis in forty seconds
- Designed for operation by non-technical personnel
- Percentage concentration of up to eight elements, at a glance
- Automatic servo monitor for constant optical alignment
- Sealed optical system
- Dust-tight electronic-system protection

The Spectromet is especially designed for routine analytical control right on the foundry floor. Rapid, accurate, direct-reading percent concentrations of up to eight elements can now be made without the need for an air-conditioned laboratory. The Spectromet is insensitive to plant environment.

Operation of the Spectromet is extremely simple. Prepared samples are placed in the instrument . . . loading door closed . . . start button depressed . . . and forty seconds later results are read on calibrated dials. Non-technical personnel become proficient operators in a very short time.

No critical adjustments are required. Reliable patented measuring circuit utilizes logarithmic measuring system for accuracy. Plug-in electronic components assure continuous operation — rapid replacement. The Spectromet incorporates another first by Baird Associates — the automatic servo monitor mechanism that maintains continuous optical alignment. The servo monitor automatically keeps spectrum lines centered in their exit slits without adjustment by the operator.

*Complete information on the Spectromet and other Baird Associates Control Analysis Instruments available on request.*

*TRADE MARK

BAIRD

## *Baird Associates, Inc.*

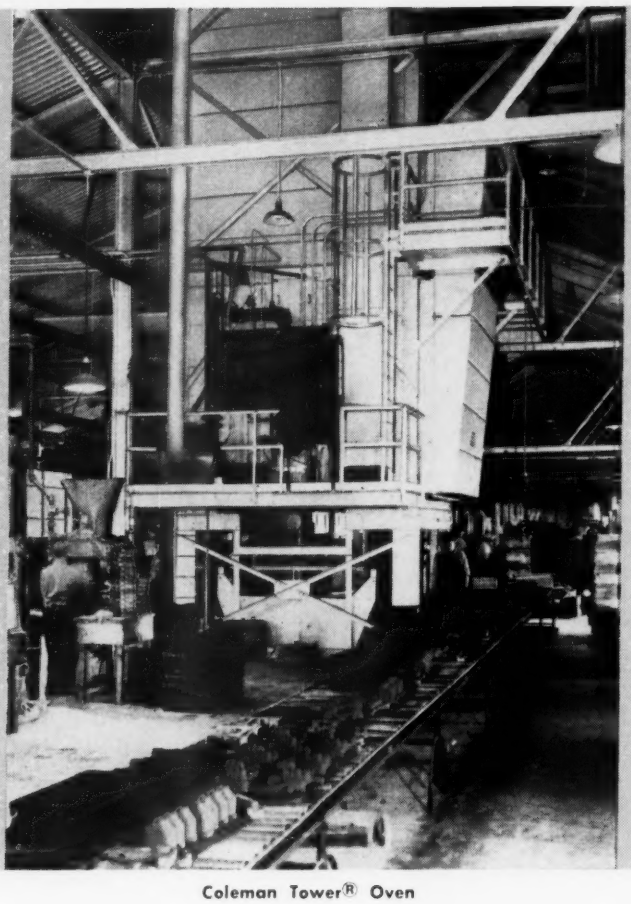
33 UNIVERSITY ROAD, CAMBRIDGE 38, MASSACHUSETTS

**Spectromet will be demonstrated at Booth 1835, Foundry Show.**

# keeping your production "on the go"

# COLEMAN

Coleman Tower® Oven



Coleman Tower® Oven

THE BEST plans for improving foundry production with time and labor saving equipment are incomplete without the correct core and mold ovens. Dependable, efficient, modern ovens — Coleman Ovens — keep production "on the go" . . . increase over-all profits.

You can always depend on Coleman Ovens to do consistently better work at less cost. Extensive use in foundries everywhere, repeat order installations, and acknowledged superiority are proof of their ability to meet all the requirements of modern foundry practice.

Be realistic in your plans for improving production. Find out now what the dependable performance and cost saving factors of Coleman Ovens can mean to you. Let our experienced engineers show you how the right Coleman Oven can pay big dividends in your foundry.

***As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best for your purpose.***

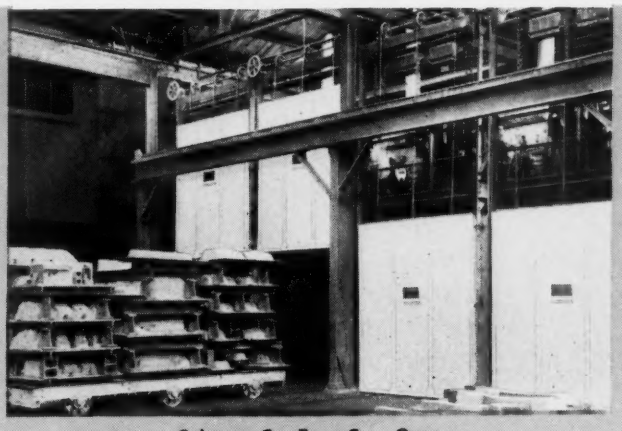
**WRITE FOR BULLETIN 54**

**THE FOUNDRY EQUIPMENT COMPANY**

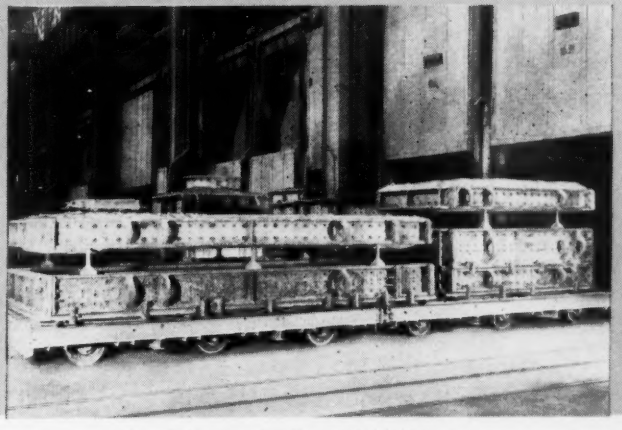
1821 COLUMBUS ROAD — CLEVELAND 13, OHIO

*World's Oldest and Largest Foundry Oven Specialists*

# . . . profitably!
# OVENS

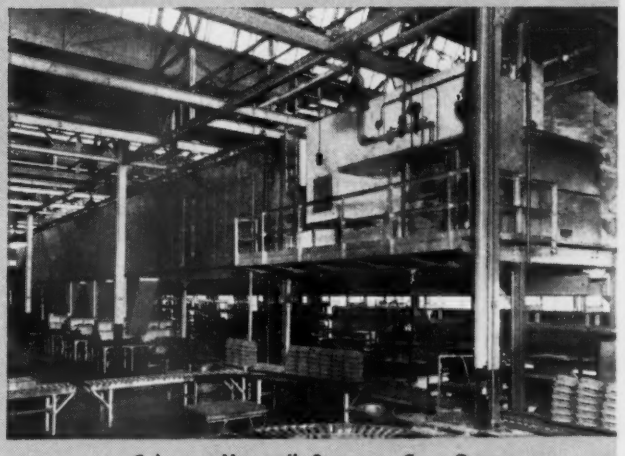


Coleman Car-Type Core Ovens

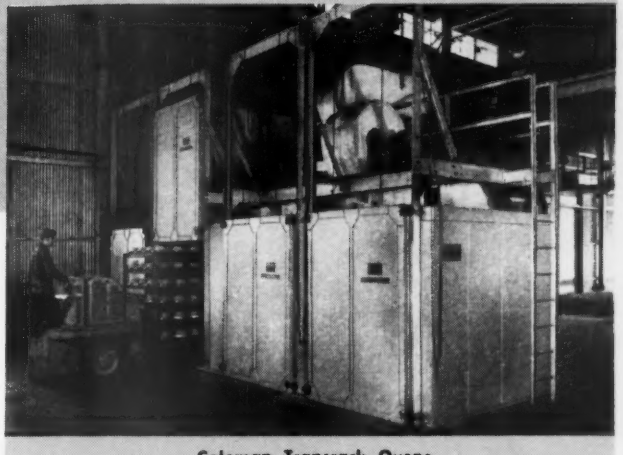


Coleman Car-Type Mold Ovens

Coleman Dielectric Oven



Coleman Monorail Conveyor Core Oven



Coleman Transrack Ovens

Coleman Rolling Drawer Ovens

## Only COLEMAN offers a complete line of foundry ovens with all these advantages

**RECIRCULATING HEATING OR DIELECTRIC SYSTEMS** to meet your requirement best.

**DEPENDABLE BAKING AND DRYING.** Coleman Ovens remove all uncertainties in core baking and mold drying. Rejects and make-overs are eliminated.

**INCREASED LABOR SAVING.** Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

**HEAVY DUTY CONSTRUCTION.** Responsible for dependable performance, economical operation, and minimum maintenance cost under rugged service requirements.

**MAXIMUM FUEL ECONOMY.** Coleman Heating Systems use the most economical fuel available to you — gas, oil, stoker-coal, electricity, etc.

**FLEXIBILITY AND ACCURATE CONTROL** to bake oil or resin binders — whichever is most satisfactory for your requirements.

**BETTER WORKING CONDITIONS.** Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases — helps to make the core department a good place to work.

**ADVANCED OVEN "KNOW-HOW".** Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work.

**WIDEST EXPERIENCE.** Gained through more than half a century of specialization in foundry ovens and the building of over 11,000 successful Coleman Oven installations.

# THE NEW PRIME-MOVER M30 WITH TORQUE CONVERTER DRIVE

*Bulk-handling body shown. Capacity 18 cu. ft.*

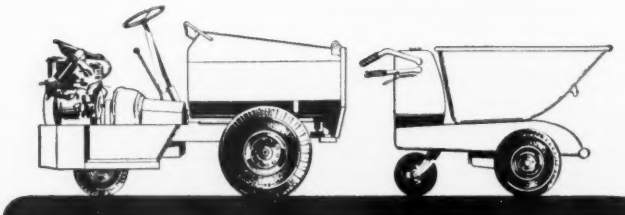
***Puts greater POWER • SPEED • CAPACITY to work for you!***

## PROVED BY PERFORMANCE IN FOUNDRIES

**The M-30 delivers high production on your toughest handling jobs. Carries a ton-and-a-half load. Maneuvers in close quarters. Climbs steep grades. Travels fast.**

**Propelled by the exclusive Prime-Mover torque converter drive—no shifting—no clutching. You set the directional lever in forward or reverse—and step on the gas.**

**Let this husky truck with its dependable Wisconsin engine and smooth torque converter do more work for you. See nearest Prime-Mover distributor about your handling problems. The Prime-Mover Co., Muscatine, Iowa.**



**PRIME-MOVER**

**More power to you—from PRIME-MOVER**



*For more information, use Reader Service Card, page 347*

# BIRDIE... thanks to brick!

And impossible *without* brick. You would have no rubber for the ball... no steel for the clubs. You would have no mower to trim the fairways and clip the greens. And no clubhouse.

Everything made... everything that moves... owes its very existence to refractory brick... refractory brick that contains and controls the many flames of industry. Brick in infinite variety of shape and composition. There could be no industry were it not for brick.

And General Refractories, to provide the complete refractory service that industry needs, employs the world's largest, most-modern refractories research laboratory and 66 mines and manufacturing plants both here and abroad.

*A Complete Refractories Service*

GENERAL REFRACTORIES COMPANY

Philadelphia 2

GENERAL REFRACTORIES

## A COMPLETE REFRACTORIES SERVICE FOR THE FOUNDRY INDUSTRY

BRIKRAM 80, a high alumina ramming mix, is giving outstanding service in many foundry furnace applications.

BRIKRAM 80 when rammed in place behind rigid forms, forms an excellent refractory lining wherein temperature and resistance to strong flux or slags are desired. BRIKRAM 80 is used to construct the lower side walls and bottoms of aluminum melting and holding furnaces, center sections of electric furnace roofs and side walls and bottoms of malleable iron furnaces.

BRIKRAM 80, because of its high alumina content, is recommended for use in desulphurizing units where soda ash and other potent fluxes are used. Ladle life can also be increased by using BRIKRAM 80 in the places where the severe wear occurs. In case of ladles holding high temperature stainless steel, or other metals, long service is given by BRIKRAM 80.

For abrasion conditions, HIGH STRENGTH BRIKRAM 80 is available. This material takes a very hard air set and maintains it up to the softening point of the material.

Consult your local GREFCO representative for more complete details of these, and other GREFCO, products.

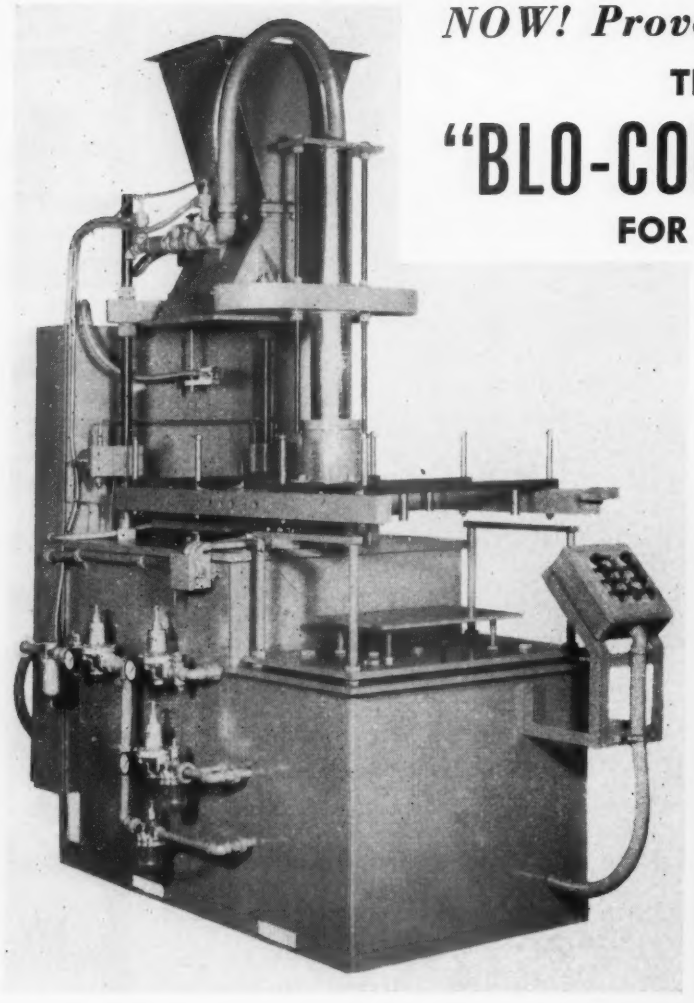
*NOW! Proven by actual foundry tests!*

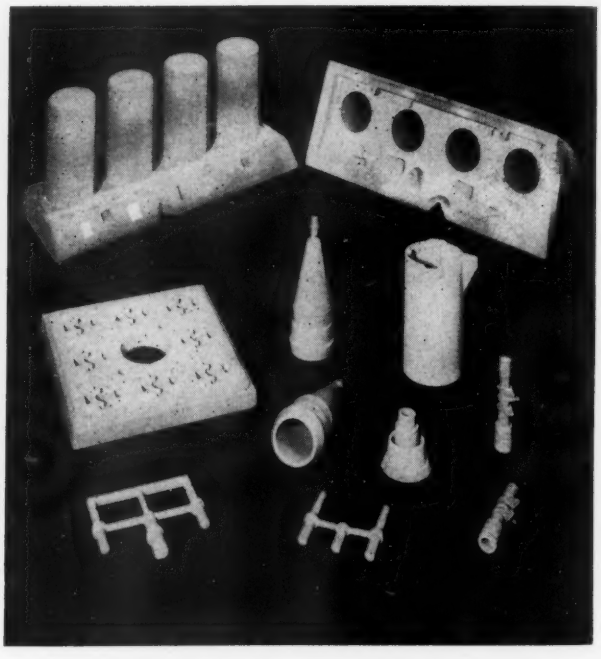
THE NEW AUTOMATIC

# "BLO-CORE" SHELL MACHINE

FOR HIGH PRODUCTION OF

# SHELL CORES and SHELL MOLDS





Check the outstanding features of this "BLO-CORE" SHELL MACHINE:

- ☑ Core boxes up to 15" x 20" x 30" high.
- ☑ Patterns up to 16" x 22" x 14" draw.
- ☑ Vertically parted core boxes.
- ☑ Horizontally parted mold boxes.
- ☑ Two station rotary operation.

Featured at the right are shell molds and shell cores made on this machine.

**SEE THIS MACHINE IN OPERATION AT THE FOUNDRY SHOW, MAY 3—May 9**

***See it produce shell cores or shell molds every 30 seconds!***

**ATLANTIC CITY . . . VISIT BOOTH 1944-B**

## *No other shell machine is so flexible*

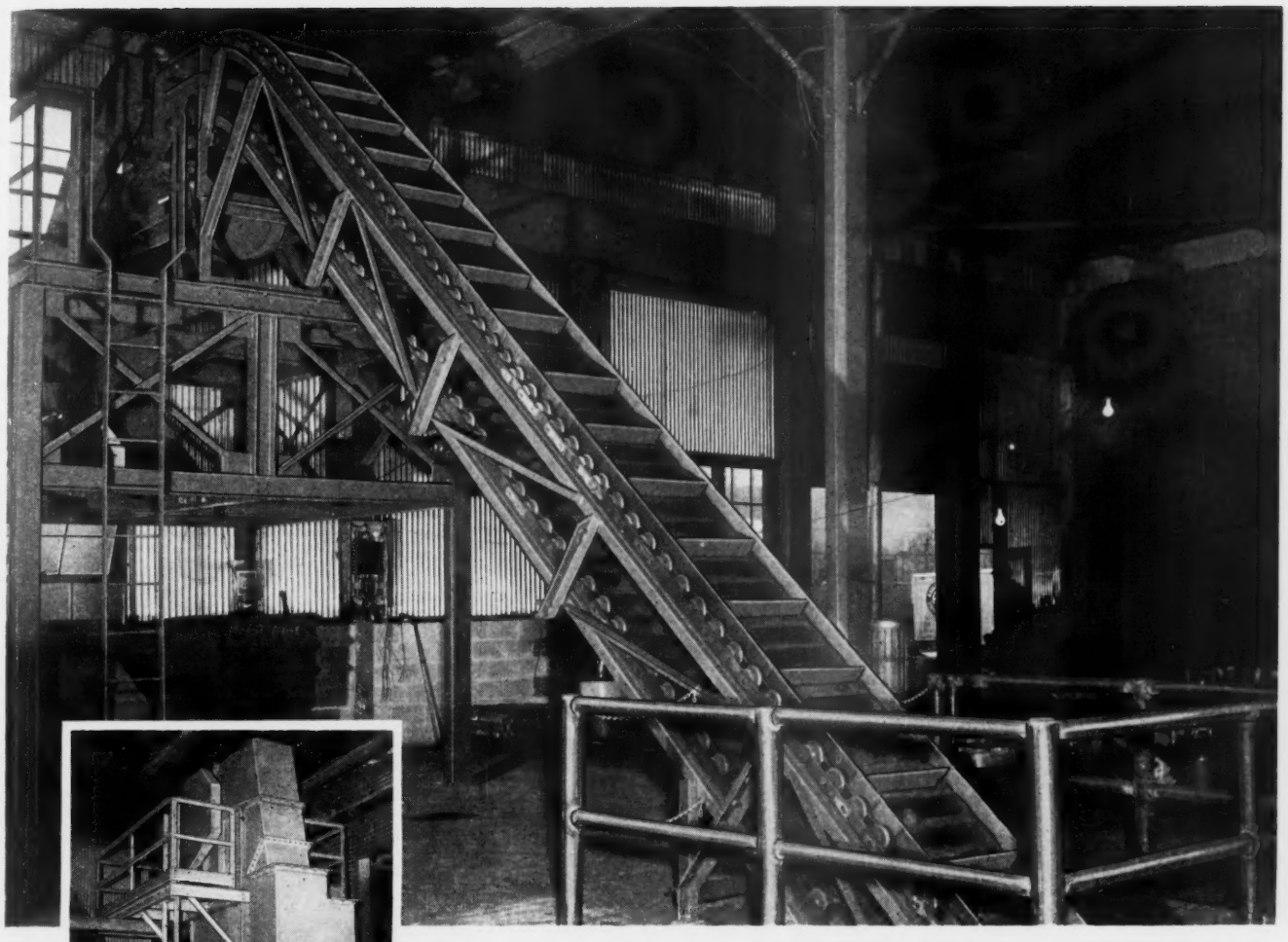
C&S

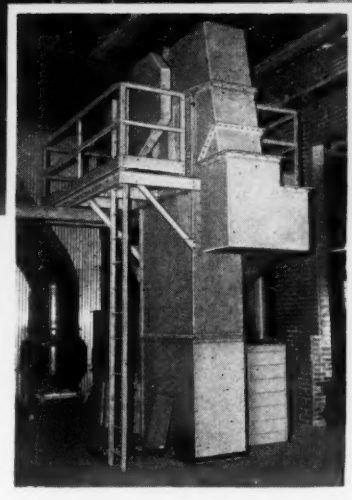
See it NOW . . . . Call or write for Bulletin CS-15

**C&S PRODUCTS COMPANY**

INCORPORATED

12733 Fullerton • Detroit 27, Mich.





This compact, shot-return bucket elevator is an example of Webster's superior design application for handling unusual loads economically.

# WEBSTER LEAK-PROOF APRON CONVEYOR

**at Lynchburg Foundry Company,**
**Lynchburg, Virginia,**

## *Efficiently Handles Shot and Refuse*

Webster equipment for the modern foundry also includes complete sand preparation systems, mold conveyors, and castings cooling conveyors. Units are custom-built to satisfy your particular requirements.

Do you have a hard-to-solve foundry conveying problem? A Webster engineer, backed by Webster's seventy-nine years of experience, will gladly visit your plant and work with you. There's no obligation . . phone or wire us today for quick service.

**WEBSTER MANUFACTURING, INC.**
**Tiffin, Ohio**
*Offices in All Principal Cities*

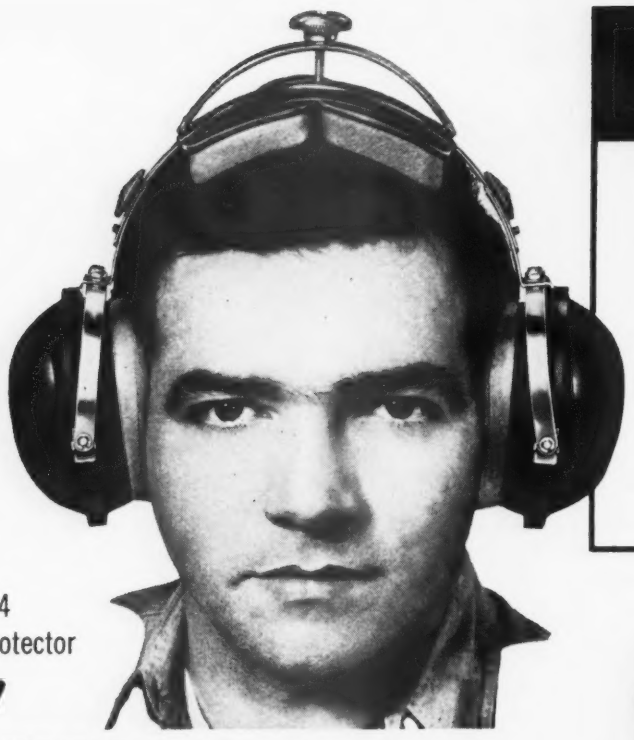
Webster

**BULK MATERIALS HANDLING EQUIPMENT**

*Since 1876 Serving All Industry*

Specialty Safety Products

# Sound Investments in Safety by AO for Noise Control and other Hazards



AO 372-14
Sound Protector

***NEW***

AO ADJUSTABLE *Straightaway Sound Protector. Manual adjustment knob* for exceptional comfort — permits wearer to adjust pressure as harmful noise varies in intensity from average to extreme. Elongated type protector covers jawbone opening. Excellent for low and high frequency noise levels. Long life neoprene rubber covered metal spring headband. Dielectric, vinyl sponge ear cups provide complete ear seal. Easily sterilized. Many other features — write for literature.

Wide (1¾″)
AO 109B Cellulose
Sponge Sweatband
for Regular Use

AO Sentry-Lite Model 200X

AO SWEATBANDS are More Than Comfort Items . . . *they help prevent Eye and Other Accidents — keep Production Moving!* Accident dangers increase and production dips when sweat drips into a worker's eye. Sweat can carry foreign, irritating particles into the eye, temporarily blind, and blur or steam goggles or spectacles. This lowering of visual efficiency results in poorer work and can cause accidents. What's more, constant wiping of the forehead costs money in interrupted production. In hot weather, on hot jobs keep your workers cool and "collect" — with AO Sweatbands!

**QUICK FACTS**

- Absorb 16 to 20 times their weight
- Lightweight — 109B model weighs less than ½ oz., narrow 108B model even less
- Made to take washing and sterilizing without harm — for repeated use
- Nontoxic, nonirritating
- All rubber adjustable strap

## In Emergencies a POWERful Friend!

AO SENTRY-LITE goes on instantly, automatically when power fails. Prevents injury — panic — pilfering — sabotage — spoilage of goods and work stoppage. Lights 10,000 sq. ft. for 12 hours or longer — shuts off automatically and recharges when power resumes. Battery needs water only once a year. Portable, excellent auxiliary light. Companion model has single head and illuminates 5,000 sq. ft. for 15 hours or longer.

American Optical
SAFETY PRODUCTS DIVISION

YOUR NEAREST AO SAFETY PRODUCTS REPRESENTATIVE CAN SUPPLY YOU

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

# How SHELL MOLDING with G-E shell resins CUTS COSTS for CRUCIBLE STEEL COMPANY OF AMERICA

Ask Crucible Steel about shell molding with General Electric shell resins and you'll get a glowing report on *better castings at lower cost!* For Crucible finds the shell process ideal for casting parts in its new Rexalloy*—a super-hard alloy that's too tough to machine easily, too expensive to waste through machining allowances. Shell-molded Rexalloy parts are often usable as cast—far smoother and sharper than conventional sand castings—much less expensive than investment castings. To obtain these benefits, Crucible uses G-E shell resins, relying on them for batch-after-batch uniformity and properly balanced properties.

*Reg. trademark, Crucible Steel Company of America.

### How can shell molding help YOU?

General Electric offers a number of products to help foundrymen get maximum benefits from the shell process: *G-E phenolic shell-molding resins* to form light, dimensionally accurate molds . . . *G-E silicone release agents* to free molds easily from patterns . . . *G-E phenolic bonding resin* to cement shell halves together.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

### Ask G. E. about shell molding!

General Electric maintains a shell-molding laboratory in Pittsfield, Mass., to help users and prospective users of shell molding solve problems and evaluate the process. G.E. also offers a 28-page manual describing the techniques and benefits of this new foundry method. *Just mail the coupon for a free copy!*

**FREE SHELL-MOLDING MANUAL!**

General Electric Company
Section 6F3A2
Chemical and Metallurgical Division
Pittsfield, Massachusetts

Please send me a free copy of *G-E Shell Molding Manual.*

( ) We are presently using the shell-molding process.
( ) We are interested in the shell-molding process.

Name _____

Firm _____

Street _____

City _____ Zone ____ State ____

# IT'S THE NATIONAL MOLDER'S

- **One operator supplies sand for up to *4 molders*.**
- **Costly sand haulage and cluttered floor is *eliminated*.**
- **You get uninterrupted flow of fluffy, lump-free sand at molding station . . . *within 30 seconds*.**
- **You make *maximum* use of molders' time.**

See the Molder's Helper in operation, at the FOUNDRY CONGRESS . . . Atlantic City, May 3-9.

Shown above is a National Molder's Helper designed to operate with a No. 1½F Simpson Mix-Muller. The 1000 lb. batch is elevated, aerated and delivered to two 50 cu. ft. hoppers.

# SHELPER

## And it's a Complete SAND PREPARING SYSTEM

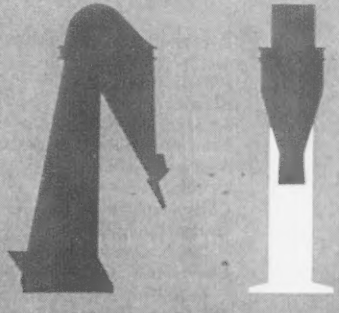
The National MOLDER'S HELPER is designed to free you of the loss in time, production, labor and actual out-of-pocket *money* involved in hauling sand from mixer to molder.

It's a low cost, completely integrated, sand preparing and handling system, which requires far less floor area than a floor molding set-up. With it, *one operator* can handle the preparation, aerating and delivery of sand, ready to use . . . for up to *four* molding stations. The savings in manpower can pay for the unit in a short time.

But look what *else* you get: A unique "eleveyor"-aerator combination handles the discharge from *any* size Simpson Mix-Muller and delivers it, free flowing and lump free, to the molder hopper *in less than 30 seconds!* A variety of arrangements are available and you can use any production size Simpson Mix-Muller, including the one you're now using.

Your NATIONAL man has all the details. Call him today for further information or write for details. Either way—be sure to see the Molder's Helper, in action at the NATIONAL booth in Atlantic City, May 3 thru 9.

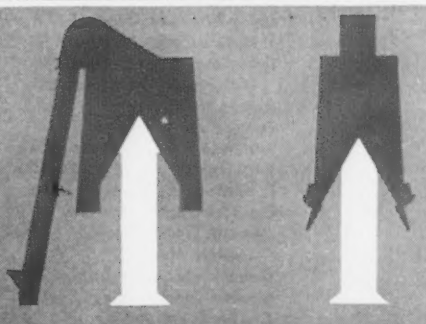
*You can choose from a Variety of Arrangements*



**Single molders station**

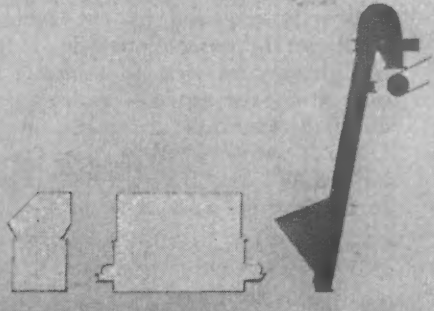
**Double molders station**

**(Side or front discharge to molding machines available.)**



**4-Station Unit**
**Can be charged by one or more Mix-Mullers.**

**Note: air operated gates are optional.**



**For discharge to belt. ("Eleveyor" only) 75 cu. ft. storage hopper available for use where front end loader is used rather than direct discharge from mixer.**

*National Engineering Company*

**646 Machinery Hall Bldg. • Chicago 6, Illinois**

# FORD CLEVELAND FOUNDRY SAVES MONEY with K&R Core Wire Straighteners

**Savings ranging from $75.00 to $150.00 a month** are not unusual in foundries using K&R Core Wire Straighteners. Proof that these machines are widely recognized as substantial money-savers is seen in the partial list of K&R users at right. Further proof — scores of foundries, like the Ford Cleveland Foundry shown above, own up to 10.

Since a high degree of straightness is not ordinarily required by the average foundry, K&R straighteners are ideal, for they re-straighten core wire to a usable condition — over and over again — as long as it remains ductile. Machines are made in two sizes — DX-5 for wire 1/8" to 3/8" dia., and F-5 for wire 3/16" to 3/4" dia. Bulletin 58B contains all the facts. Send for it.

**A few of the companies now using K&R Straighteners . . .**

Allis-Chalmers Mfg. Co.
Aluminum Co. of America
American Steel Foundries
Bohn Aluminum & Brass Corp.
Bonney-Floyd Co.
Cadillac Motor Car Co.
Caterpillar Tractor Co.
Central Foundry, Div. of General Motors
Chevrolet-Saginaw Grey Iron Foundry
The Cooper-Bessemer Corp.—Mt. Vernon, Ohio
The Cooper-Bessemer Corp.—Grove City, Pa.
Crane Co.
Delco-Remy Div. General Motors Corp., Anderson, Ill.
Delco-Remy Div. General Motors Corp., Bedford, Ind.
Dodge Steel Co.
Farrel-Birmingham Co., Inc.
Ford Motor Co.—Windsor, Ont.
Ford Motor Co.—Cleveland, O.
Ford Motor Co.—Detroit, Mich.
General Electric Co.—Erie, Pa.
General Electric Co.—Everett, Mass.
General Malleable Corp.
General Steel Castings Corp.
Goulds Pumps Inc.
Hercules Foundry Div. U. S. Challenge Co.
Ingersoll-Rand Co.
International Harvester Co.
International Motor Co.
John Deere Tractor Co.
McKinnon Industries Ltd.
Minneapolis Moline Power Implement Co.
National Malleable & Steel Castings Co.
Oberdorfer Foundries Inc.
Ohio Steel Foundry Co.
Pacific Car & Foundry Co.
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
Pontiac Motor Div. General Motors Corp.
Pratt & Letchworth Co. Inc.
Renault, France
Saginaw Malleable Iron Div. General Motors Corp.
Servel, Inc.
Societe Stein et Roubaiz
St. Louis Steel Casting Co.
Stone & Webster Engineering Co.
Studebaker Corp.
Symington-Gould Corp. (The)
Worthington-Simpson Ltd.
Wright-Aero. Corp.

**66 Years of Metalworking Experience Built into K&R Machines:**

Cold Roll Forming Machines
Bending Rolls — Straightening Rolls
Crimping Machines
Slitting Lines — Flying Shears & Saws
Hydraulic Tube Benders
Hydraulic Bulldozers — Hydraulic Presses
Edging Machines
Special Metalworking Equipment

**KANE & ROACH**
INCORPORATED
Syracuse, New York
*Established 1887*

# Late News



**URGES EXPORT CUT:** The House Banking Committee says 1955 exports of more than 5 million tons of iron and steel scrap were too high. While it voted to extend for another two years the government's export control authority, the committee urged that exports be reduced "to a level where we can be reasonably sure of an adequate supply of scrap for domestic needs."

The committee said it realizes that the needs of our Allies abroad must be considered and that it would be too disruptive of international relations to cut off scrap exports completely now. At the same time, the committee declared that some means must be found for reducing exports, either through agreements with foreign producers to whom we are now exporting scrap, or through imposition of stricter controls under the Export Control Act. This recommendation coincides with the viewpoint expressed by foundry representatives in testifying recently before the committee.

Domestic scrap prices meanwhile have stiffened after a brief slump early in the year. Prices of steelmaking grades have soared to an all-time high. Short steel rails today are bringing nearly 50 per cent more than they did a year ago, and cast grades are about 25 per cent higher than in April, 1955.

**AFS DIRECTOR DIES:** Martin Lefler, plant manager, Oliver Corp., South Bend, Ind., and a national director of the American Foundrymen's Society, died Apr. 6. Before joining the Oliver Corp. he had been with Strom Brass Foundry, Elkhart, Ind., and Western Foundry Co., Chicago.

**MARKETING DIRECTOR:** Richard C. Meloy is joining the Gray Iron Founders' Society June 1 as marketing director. Since 1948 he has been manager of marketing research, Delco Appliance Division, General Motors Corp., Rochester, N. Y.

**SHIPMENTS STEADY:** January shipments of iron and steel castings totaled about the same as in December but were 15 per cent larger than a year ago, the Bureau of the Census reports. Gray iron shipments of 1,249,518 tons compare with 1,091,923 tons in January, 1955. Steel casting shipments totaled 158,618 tons, against 98,238 tons last year. Malleable iron shipments rose from 82,028 tons a year ago to 93,562 tons this year. The latter figure includes 14,156 tons of pearlitic malleable.

**PLANT VISITS:** A number of foundries in the Philadelphia and nearby areas will be open for visits by those attending the American Foundrymen's Society Congress and Exhibit at Atlantic City. Ferrous and nonferrous shops as well as patternmaking operations may be seen. Information about the location of the plants, type of operations and hours for visits will be available from the AFS at Booth 220, Convention Hall. No special transportation from Atlantic City to these foundries is scheduled.

**BRASS FOUNDERS ELECT:** Metropolitan Brass Founders Association Inc., New York, reelected Raymond E. Dietry, B & S Bronze Foundry Inc., Brooklyn, as president, and Robert Riescher, Sunnyside Bronze Foundry Inc., Long Island City, as vice president. This will be the second term for both. Irvin Schlansky, Thomas Paulson & Son Inc., Brooklyn, has been elected secretary-treasurer.

**ALUMINUM RECORD:** Production of primary aluminum in the United States reached an all-time high in March—146,000 tons—according to the Aluminum Association. This was 12 per cent larger than a year ago. The first quarter also was about 12 per cent ahead of last year.

Need for still further increase in aluminum production capacity is given as one reason for the recent increase of 1½ cents in prices of pig, ingot and mill products. New base prices are 24 cents a pound for pig and 25.9 cents for ingot. Reynolds Metals says primary aluminum plants cost about $1500 per ton of capacity. Its capacity, now 445,000 tons annually, will be 565,000 tons by 1958. Kaiser Aluminum plans to add 27,500 tons to the capac-

ity of its Chalmette, La., reduction plant, boosting it to 247,500 tons.

**MAGNESIUM UP:** As in the case of aluminum, Dow Chemical Co. gives the need for more capacity as one of several reasons for price increases in magnesium, effective Apr. 13. A boost of 1¼ cents a pound on primary metal raises pig to 33¾ cents and ingot to 34½ cents. Dow's AZ91B die casting alloy is up 4 cents and most other alloys are 3¼ cents higher.

**EXPANSION:** Vulcan Mold & Iron Co., Latrobe, Pa. plans to spend about $1 million on plant expansion during the next few years. Details of the expansion remain in the planning stage.

**PERSONALS:** William J. Martin Jr., for 16 years with the Peninsular Grinding Wheel Co., has been made sales manager of the Smith Facing & Supply Co., Cleveland . . . Ernest E. Harkness has been appointed production manager for Ford Motor Co.'s Cleveland Foundry. He is succeeded as manager of the pattern department by C. E. Goodman . . . Milton T. Smith has been elected president and general manager of Marion Power Shovel Co., Marion, O., and its subsidiary, the Osgood Co. . . . Gene Passman has been placed in charge of foundry facing sales by Frederic B. Stevens Inc.

**MISCELLANY:** H. E. Bremer Mfg. Co., Milwaukee, is transferring most of its sand casting operations to a new aluminum foundry at St. Anna, Wis., using the available space at Milwaukee for centrifugal casting work . . . Pennsylvania Glass Sand Corp., Pittsburgh, is opening new sales offices in the Chrysler Building, New York, and in the Enterprise Building, Tulsa, Okla. . . . Dixie Pipe & Foundry Co., Pell City, Ala., producer of soil pipe and fittings, plans modernization of its fittings production line and eventual manufacture of plumbing appliances. The program includes a new $2½ million plant . . . Metal & Alloy Specialties Co., Buffalo, has been acquired by the Silver Creek Precision Corp., Silver Creek, N. Y., and will be operated as a division of the latter with no change in management . . . Zenith Foundry Co., Milwaukee, has won an award from Employers Mutuals of Wausau for operating a year with a perfect safety record . . . Free world production of nickel in 1955 set a record at 213,500 tons, about 20,000 tons more than in 1954.

# Prices of Foundry Metals and Coke

(As of April 20, 1956)

## FOUNDRY COKE

(Per net ton, f.o.b. ovens)

| | |
|---|---|
| **BEEHIVE** | |
| Connellsville | $16.00-17.00 |
| **OVEN** | |
| Birmingham | $25.65 |
| Buffalo | 27.50 |
| Chicago | 27.00 |
| Detroit | 27.50 |
| Erie, Pa. | 27.50 |
| Indianapolis | 26.75 |
| Kearny, N. J. | 26.75 |
| Lone Star, Tex. | 19.50 |
| Milwaukee | 27.50 |
| Montreal, Que. | 28.50 |
| Neville Island (Pittsburgh) | 26.25 |
| New England, deld. | 28.55 |
| Painesville, O. | 27.50 |
| Philadelphia | 26.50 |
| St. Paul | 26.50 |
| Swedeland, Pa. | 26.50 |
| Terre Haute, Ind. | 26.75 |

## PIG IRON

(Per gross ton f.o.b. furnace)

| | No. 2 Foundry | Malleable |
|---|---|---|
| Bethlehem, Pa. | $62.50 | $63.00 |
| Birmingham | 55.00 | 59.00 |
| Buffalo | 60.50 | 61.00 |
| Chicago | 60.50 | 60.50 |
| Cleveland | 60.50 | 60.50 |
| Duluth | 60.50 | 60.50 |
| Erie, Pa. | 60.50 | 60.50 |
| Everett, Mass. | 62.50 | 63.00 |
| Fontana, Calif. | 68.00 | .... |
| Geneva, Utah | 60.50 | .... |
| Granite City, Ill. | 60.90 | 61.40 |
| Lone Star, Tex. | 55.00 | .... |
| Neville Island (Pittsburgh) | 60.50 | 60.50 |
| Steelton, Pa. | 62.50 | 63.00 |
| Swedeland, Pa. | 62.50 | 63.00 |
| Toledo, O. | 60.50 | 60.50 |
| Troy, N. Y. | 62.50 | 63.00 |
| Youngstown, O. | .... | 60.50 |

## NONFERROUS INGOT

(Cents per pound, carlots)

**BRASS AND BRONZE:** Red brass, No. 115, 42.00; tin bronze, No. 225, 55.75; No. 245, 48.75; high-leaded tin bronze, No. 305, 45.75; No. 1 yellow, No. 405, 33.25; manganese bronze, No. 421, 37.75.

**ALUMINUM:** 99 per cent plus primary ingots 25.90. Secondary No. 12 alloy 28.75-29.50. Deoxidizing grades: No. 1 29.50-30.50; No. 4 27.00-28.00.

**MAGNESIUM:** 99.8 per cent notched ingots 34.50, f.o.b. Velasco, Tex. (10,000 lb or more).

**COPPER:** Electrolytic 46.00 delivered Connecticut valley.

**ZINC:** High grade 14.85 delivered. Die casting alloy No. 3, 18.00 delivered.

## IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

| | No. 1 Heavy Melting Steel | No. 1 Cupola Cast | Heavy Breakable Cast | Clean Auto Cast | Machinery Cast | Malleable | Short Steel Rails |
|---|---|---|---|---|---|---|---|
| Birmingham | $37.00-38.00 | **$47.50-48.00 | ..... | ..... | ..... | ..... | $61.00-62.00 |
| Boston* | **47.50-48.00 | **41.50-42.00 | ..... | ..... | **44.00-44.50 | ..... | ..... |
| Buffalo | 55.00-56.00 | **50.00-51.00 | ..... | ..... | **54.00-55.00 | ..... | 64.00-65.00 |
| Chicago | 53.00-56.00 | 51.00-52.00 | ..... | 55.00-56.00 | 55.00-56.00 | 63.00-64.00 | 71.00-73.00 |
| Cincinnati* | **53.00-54.00 | **49.00-50.00 | **47.00-48.00 | ..... | **58.00-59.00 | ..... | **70.00-71.00 |
| Cleveland | 57.00-58.00 | 58.50-59.50 | 49.00-50.00 | 58.50-59.50 | 59.00-60.00 | 65.00-66.00 | 73.00-75.50 |
| Detroit* | **54.00 | **46.00 | **38.00 | **52.00 | ..... | **52.00 | ..... |
| Los Angeles | 38.00 | **42.00 | ..... | ..... | ..... | ..... | ..... |
| New York* | 49.00-50.00 | 42.00-43.00 | 46.00-47.00 | ..... | ..... | ..... | ..... |
| Philadelphia | 56.00 | 49.00-51.00 | 54.00 | ..... | 56.00 | 68.00 | ..... |
| Pittsburgh | 54.00-55.00 | 52.00-53.00 | 48.00-49.00 | ..... | 57.00-58.00 | ..... | 74.00-76.00 |
| St. Louis* | 45.00 | 46.00 | 43.00 | 49.00 | ..... | ..... | 71.00 |
| San Francisco | 36.00 | 45.00 | 36.00 | 45.00 | 50.00 | ..... | ..... |
| Seattle | 39.00 | **43.00 | **35.00 | **35.00 | ..... | ..... | ..... |

*Brokers' buying prices. **F.o.b. shipping point

# For Cleaner Surfaces, Better Shakeout, Try WHITEHEAD'S NEW LYQUAFLOUR

**Our new plant has just been completed at Irwin, Penna., to produce the new DOUBLE-STRENGTH LYQUAFLOUR. This compound of a special hydrocarbon and woodflour improves castings and mold conditions for all types of metals. Highly recommended for the advantages listed below:**

- One sand additive controls both peel and expansion
- Good shakeout saves sand
- Imparts highest flowability to sand mixture to give pattern true finish
- 2% initial treatment of sand and as little as ¼ of 1% to reactivate does the job
- Replaces any carbon or hydrocarbon materials now used
- Eliminates dust at the muller
- Castings peel excellently which reduces cleaning room time
- Reduces penetration and burn-on
- Overcomes sand expansion defects, maintains good compression strength
- Improves molding, "feel", and "moldability"
- No rigid control required
- Permits hard ramming
- Less ramming required, more molds per hour
- Less temper water needed

**See Us at the AFS Castings Congress BOOTH 1011**

## Whitehead Brothers COMPANY

Established 1841

**NEW YORK OFFICE**
324 West 23rd St., New York 11, N. Y.

**NEW ENGLAND OFFICE**
17 Exchange Place, Providence, R. I.

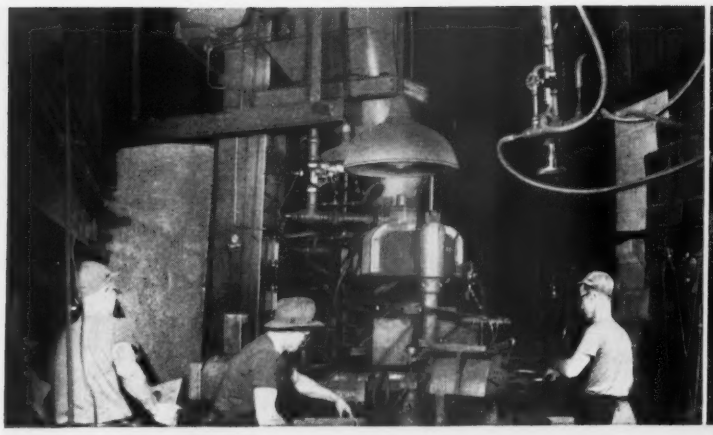
***Manufacturers of***

**LYQUAGRIP**
Ready-to-use core paste

**JOINT SEAL**
Plastic compound for perfect sealing

**LYQUAFACE**
The liquid sand grain coating

**DOB-IT**
Ready-to-use core mudding compound



LAKEY FOUNDRY AND MACHINE CO., Muskegon, Mich., is using standard Handy Sandys in conjunction with Rotary Core Blowers to help jump production of cores from 350 to 2500 daily. Production per man has more than doubled since the Newaygo units were installed. To meet the space problem in the core room, Newaygo developed special storage hoppers, wing boards and special feed hoppers.

Each Handy Sandy is capable of feeding over 8 tons of core sand per hour to each core blowing unit. The cores average from 14 to 50 lbs. each.

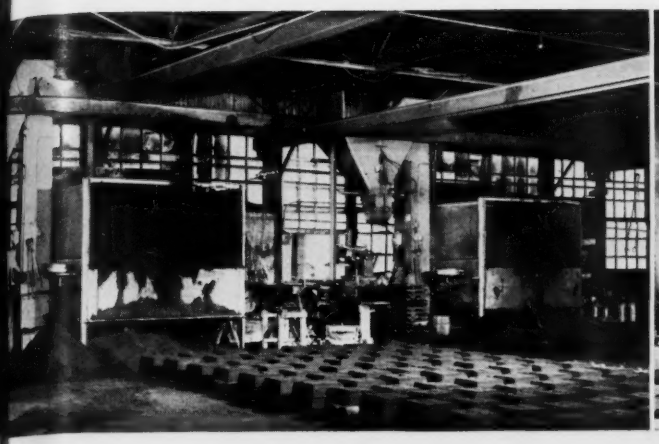
GENERAL ELECTRIC COMPANY'S Malleable Iron Foundry in Erie, Pa., is using two Twin Hopper Handy Sandys to replace six floor molding units making malleable castings for locomotive and car equipment. The General Electric Company is very well pleased with the performance of this Newaygo Equipment and has reported maintenance costs to be extremely low.

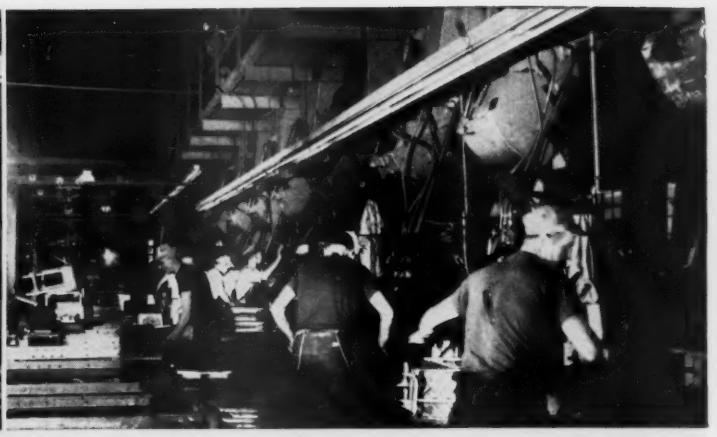
# Foundry Business is BIG

## *and profitable with* NEWAYGO *mold and conditioning*

SUPER HANDY SANDY in a prominent eastern foundry has shown tremendous savings. In one installation this low-cost individual floor sand handling unit increased mold production on large molds 150% due to savings in shovel time alone. Super Handy Sandys are available with single or double hoppers for supplying one or two molding stations and can handle up to 50 tons of sand per hour.

PACIFIC STEEL CASTINGS COMPANY, Berkeley, Cal., is another example of a Newaygo installed Sand Handling system. "The excellent cooperation which we received from the planning stage to the completion of the installation is a real service to any company which is considering the installation of a sand handling system," states Mr. J. D. Genger, Vice President in charge of operations at this foundry.





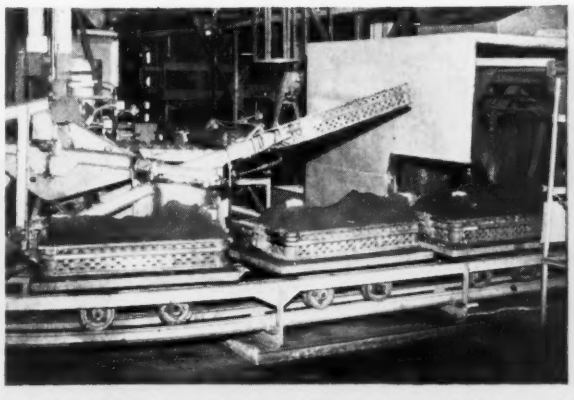
Mr. Lou Keen, President of KEEN FOUNDRY CO., Griffith, Indiana, states: "We've invested in 10 Newaygo Handy Sandys in less than 3 years for several reasons. First, these individual Sand Handling Units are very adaptable to the physical characteristics of our foundry. Second, their great flexibility gives us overhead sand stations at any point in the foundry without costly remodeling. Third, Handy Sandys require low capital investment."

AUBURN FOUNDRY, INC., Auburn, Indiana, "When our foundry 'threw out the shovel' in favor of mechanization, we picked Newaygo to work with us because of their experience in engineering and fabricating sand handling systems. With the 120 ton Sand System, increases in casting production, improved pouroff and sand handling have been very evident."

# Business...

## *handling, sandhandling equipment*

UNITED STATES FOUNDRY CORPORATION, Milwaukee, Wis. "Newaygo Handy Sandys and Reddy Sandys combine their automatic features to eliminate all shoveling from the shakeout, sand preparation and molding cycle. Their installation has made a vast improvement in working conditions and has increased over-all production 35%."



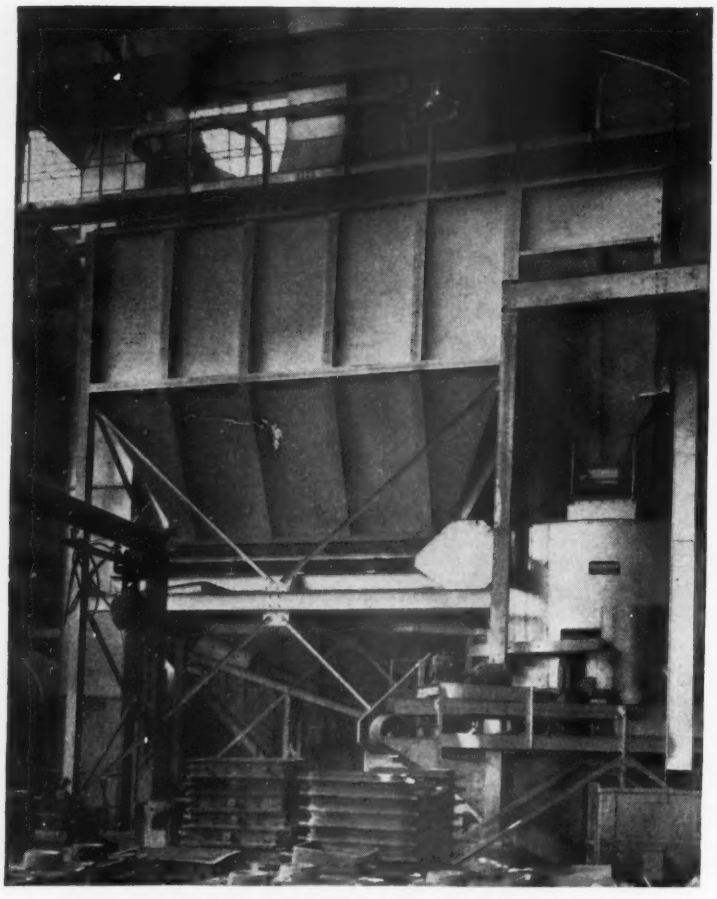
CENTRAL SPECIALTY DIVISION, Ypsilanti, Michigan, "This is the fifth sand handling system Newaygo has installed for us. On this particular job we wanted engineering ability, heavy duty specifications plus follow-through and attention to job details. Newaygo filled these requirements. This extremely compact automatic molding system is contained in an area 165' by 50' and is shaping up very successfully."

View from the pouring floor of a large midwest steel foundry showing specially designed molding hoppers of Stainclad Steel with air operated gates. Also shown is the mold storage end of the Platen Car set-out track system. Molds are handled on pallet cars and are automatically dumped at end of lines into a vibrating pan conveyor. Pallet Cars and boards are automatically returned on an underneath track system.

***A Copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire or phone today.***

***Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment***

# high quality castings need high quality foundry sand...



A Clearfield 930 Mixer is the heart of the sand conditioning system in a gray iron foundry.

**and**
**<u>that</u>**
**calls for a**

*Clearfield Mixer*

A Clearfield Mixer will consistently give you the quantity of sand when you need it, where you need it and with the desired qualities for your particular application. Clearfield Mixers are available in many sizes, to meet every requirement . . . as single units or as part of a sand processing system.

**CLEARFIELD MIXER**

**the choice of industrial leaders**

Write today for Catalog No. 83. Get the full information on the tested efficiency of all Clearfield Mixers.

## CLEARFIELD MACHINE COMPANY

Clearfield, Pennsylvania, U. S. A.



*For more information, use Reader Service Card, page 347*

over 8,000 Different Cylinder SELECTIONS—

# Miller AIR AND HYDRAULIC CYLINDERS AND BOOSTERS "IN STOCK" for immediate delivery.

See Miller Bulletins A-105K (Air) and H-104K (Hydraulic) for Complete Dimensions and Engineering Data on these "in-stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 feet.

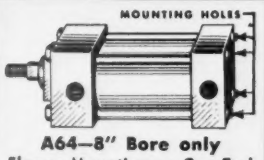
## "IN-STOCK" MODELS

"A" Signifies Miller 200 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Red On Drawings.

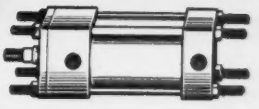
**A61 and H61**
Flange Mounting on Rod End
(A61 not available in 8" bore)

**A62 and H62**
Flange Mounting on Cap End
(A62 not available in 8" bore)

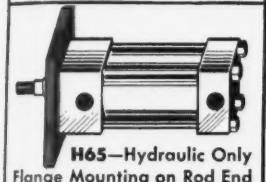
**A63—8" Bore only**
Flange Mounting on Rod End



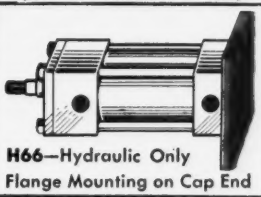

**A64—8" Bore only**
Flange Mounting on Cap End



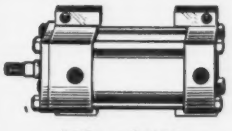
**A50 & H50**—Tie Rods not extended beyond nuts.
**A51 & H51**—Tie Rods extended both ends (shown).
**A52 & H52**—Tie Rods extended. Cap End only.
**A53 & H53**—Tie Rods Extended. Rod End only.
**A54 & H54**—Two Tie Rods extended at both ends.



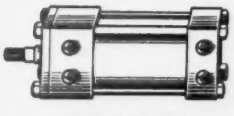
**H65**—Hydraulic Only
Flange Mounting on Rod End



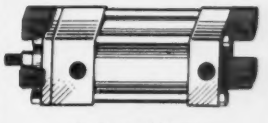
**H66**—Hydraulic Only
Flange Mounting on Cap End



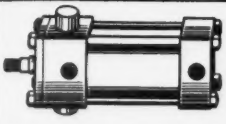
**A72 and H72**
Side Lug Mounting



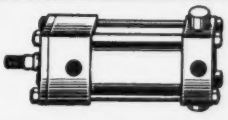
**A74 and H74**
Side Flush Mounting



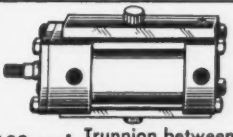
**A77 and H77**
Side or Foot Mounting



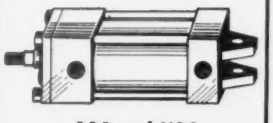
**A81 and H81** Trunnion Mounting on Rod End



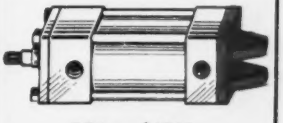
**A82 and H82** Trunnion Mounting on Cap End



**A83 and H83** Trunnion between Head and Cap
(one week delivery)



**A84 and H84**
Pivot Mounting



**A86 and H86**
Pivot Mounting

## IN-STOCK BORES In Inches

## "IN-STOCK" STROKES (in Inches)

| | BORES | ROD DIA. | ROD TURN DOWN & THREADS | | STROKES |
|---|---|---|---|---|---|
| AIR | 1½ | ⅝" | 7/16-20 | Cushioned | 3 4 5 6 7 8 9 10 11 12 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 |
| | 2 | ⅝" | 7/16-20 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 2½ | ⅝" | 7/16-20 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 3¼ | 1" | ¾-16 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 4 | 1" | ¾-16 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 5 | 1" | ¾-16 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 6 | 1⅜" | 1-14 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 8 | 1⅜" | 1-14 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| HYDRAULIC | 1½ | ⅝" | 7/16-20 | Cushioned | 3 4 5 6 7 8 9 10 11 12 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 |
| | 2 | 1" | ¾-16 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 2½ | 1" | ¾-16 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 3¼ | 1⅜" | 1-14 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 4 | 1¾" | 1¼-12 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | 5 | 2" | 1½-12 | Cushioned | 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |
| | | | | Non-Cush. | 1 2 3 4 5 6 7 8 9 10 11 12 14 16 18 20 22 24 28 32 36 |

① "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

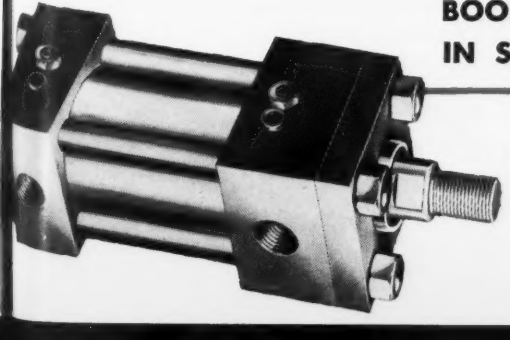
Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.



## BOOSTERS IN STOCK

Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBA8, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.

*Write For Catalog and Stock Price List*

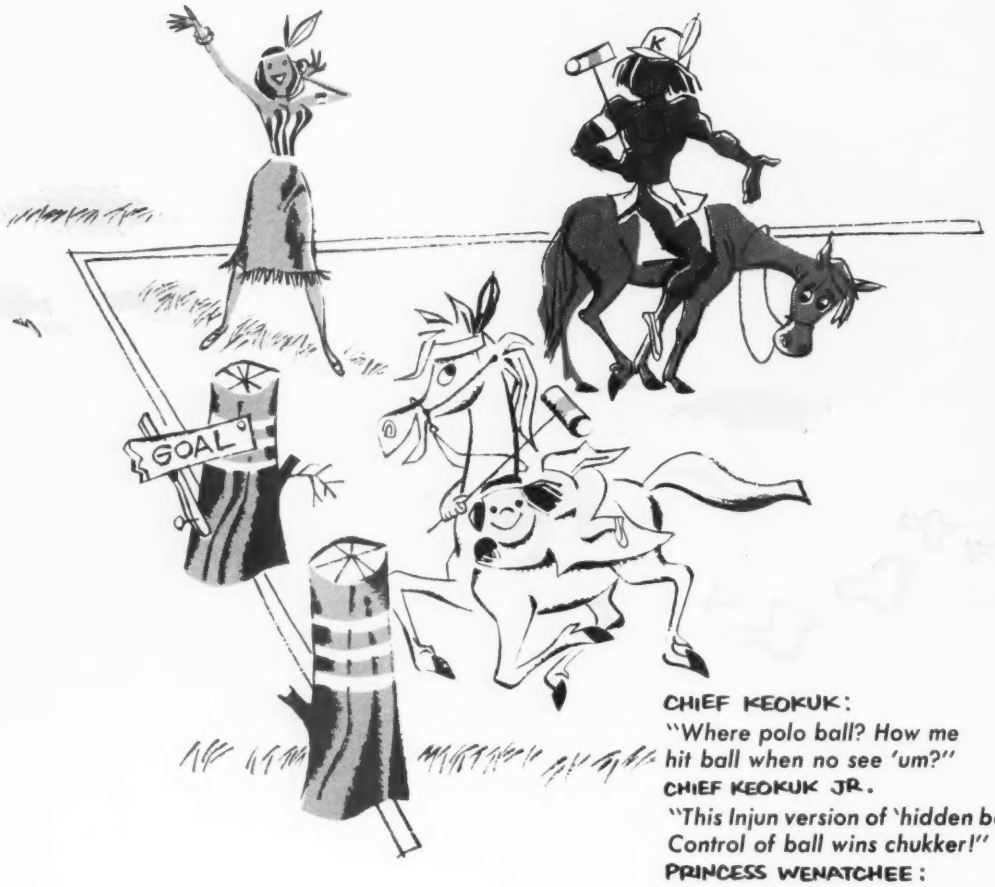

**MILLER FLUID POWER DIVISION**
FLICK-REEDY CORP.

**2034 N. Hawthorne Ave., Melrose Park, Ill.**


AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

# JUNIOR'S SOLO WINS AT POLO

## (control does the trick)




CHIEF KEOKUK:
*"Where polo ball? How me hit ball when no see 'um?"*
CHIEF KEOKUK JR.
*"This Injun version of 'hidden ball trick.' Control of ball wins chukker!"*
PRINCESS WENATCHEE:
*"Junior's goal is control —and that always pays off!"*

Control pays off . . . in polo or processing iron and steel! Many leading foundries and steel plants control costs and quality with Keokuk Silvery Pig Iron . . . the superior form of silicon introduction. Pig for pig, car for car, its uniformity never varies. Handle it by magnet . . . charge it by weight (or count the piglets for equal accuracy). Leading aluminum producers specify Keokuk Silicon Metal for uniform high purity.

*When you think of SILICON think of KEOKUK!*

**KEOKUK ELECTRO-METALS COMPANY** KEOKUK, IOWA

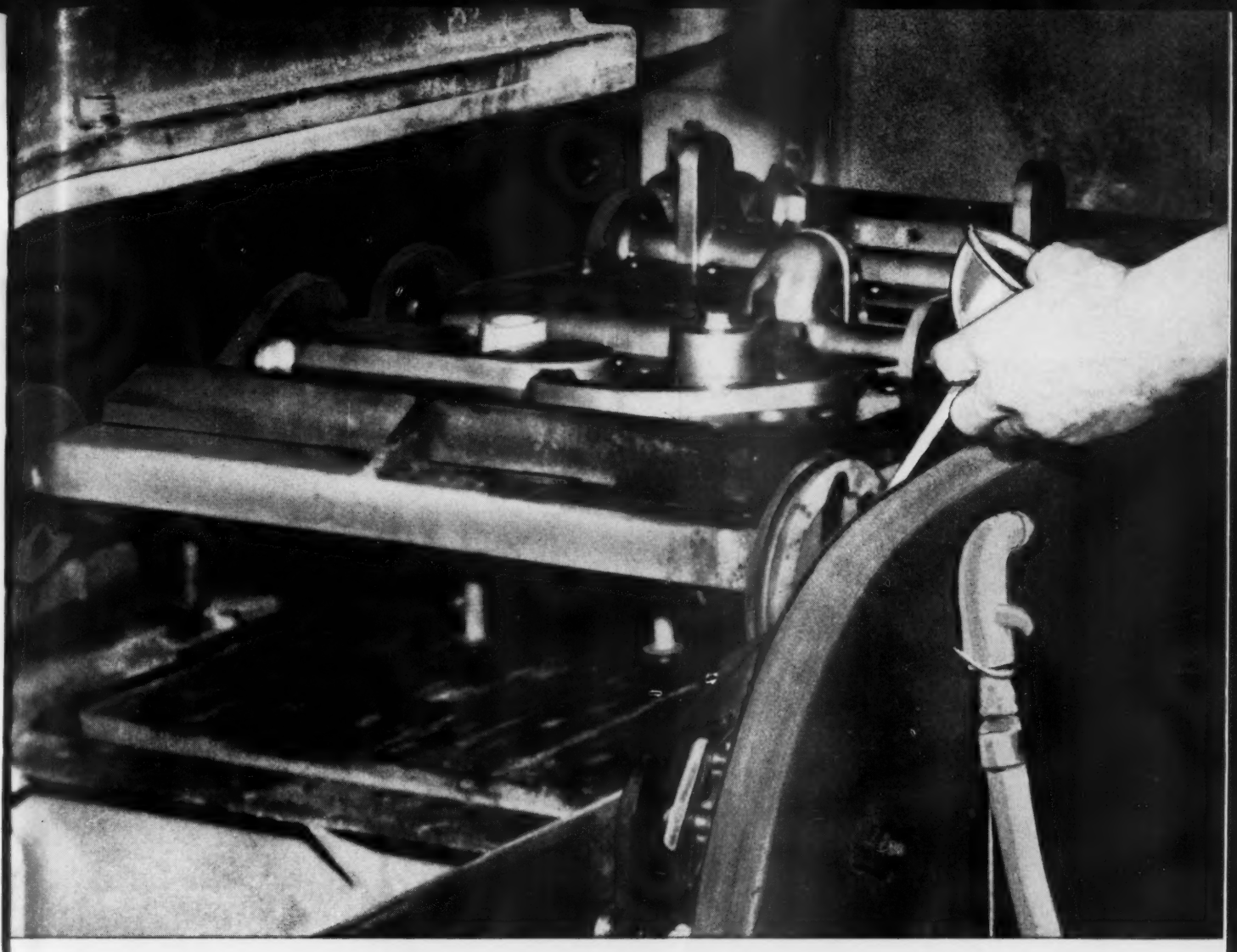
Wenatchee Division, Wenatchee, Washington

**SALES AGENT: MILLER AND COMPANY**

332 S. Michigan Avenue, Chicago 4, Illinois
3504 Carew Tower, Cincinnati 2, Ohio
8230 Forsyth Blvd., St. Louis 24, Missouri

Keokuk Silvery Pig Iron is available in 60 and 30 pound pigs and 12½ pound piglets . . . in regular analysis or alloyed with other elements to match your requirements.

*For more information, use Reader Service Card, page 347*



'dag' dispersions . . . *a touch does so much!*

# 'Oildag' vital to continuous molding-machine operation

Production Pattern & Foundry Company of Chicopee, Mass. runs its five shell-molding machines 24 hours a day to keep up with casting-floor demand for molds. To stand up under this tough service, the machines must be properly maintained.

Maintenance personnel at Production Pattern & Foundry have found that lubrication instructions of the machine's manufacturer have paid off handsomely. Shell Process Co., which makes these shell-molding machines, recommends **'Oildag'** – colloidal graphite in petroleum oil – diluted with five parts of No. 10 oil for the lubrication of critical wear points: the axle bearings of the drive mechanism, and hitch-pivots and link pins of the roller chain. Since the roller chain is subjected to 900° F temperatures within the shell-baking oven, conventional lubricants would be useless . . . would decompose and carbonize. Proof of the effectiveness of colloidal graphite for this heavy-duty high-temperature lubrication job is the fact that the machines have operated without breakdown for more than six years!

Dispersions of colloidal graphite are extremely valuable elsewhere in the foundry too: as long-lasting lubricants for moving parts of casting machines and other foundry mechanisms; as heat-resistant ladle coatings, and effective mold coatings for better parting and controlled cooling. You can learn more about the use of **'dag'** dispersions in metal-casting operations through Acheson's Bulletin 425. Write for your free copy today.

*100th Anniversary*

EDWARD GOODRICH ACHESON 1856-1931

1891—SILICON CARBIDE
1895—SYNTHETIC GRAPHITE
1906—COLLOIDAL GRAPHITE

**ACHESON COLLOIDS COMPANY**
**PORT HURON, MICHIGAN**
. . . also Acheson Colloids Ltd., London, England

ACHESON COLLOIDAL DISPERSIONS:
Graphite • Molybdenum Disulfide • Zinc Oxide • Mica and other solids

**ACHESON COLLOIDS COMPANY**
**Port Huron, Michigan, Dept. J-5**

Yes, I want your free bulletin describing **'dag'** Dispersions for Metal-Casting Operations.

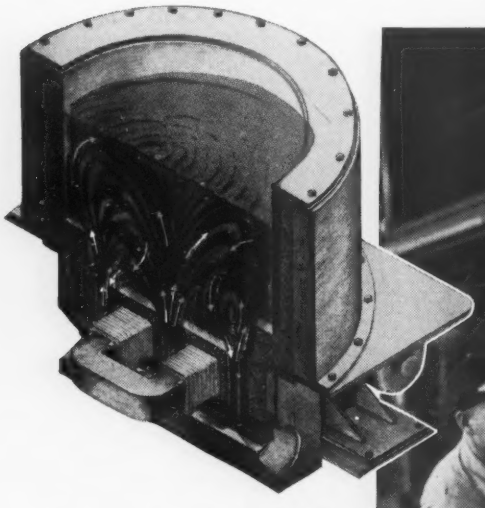
Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State____

# hard-to-melt bronzes successfully handled

## in

## ajax induction furnaces

Brass and bronze foundries all over the country have found AJAX-TAMA-WYATT induction furnaces a reliable tool for melting silicon bronzes, aluminum bronzes, leaded bronzes, phosphor bronzes, and other high strength alloys. Operation is highly economical due to the good uniformity of the alloys, low ratio of rejects, drastic reduction of metal losses, and clean operating conditions. This recent development opens the field for the use of AJAX induction furnaces in all foundries where difficult-to-melt alloys are handled.



Cross section of AJAX-TAMA-WYATT twin coil induction furnace such as used at the Torrance Brass Foundry. Heat is produced within the molten metal in the secondary channels and conveyed throughout the melt by electromagnetic circulation, resulting in minimum metal losses and high uniformity of alloy. Temperature is automatically controlled.

*Baseball Fans*—Do you recognize this man? He is Rocky Bridges, Cincinnati Redleg infielder, keeping in condition during the winter season at Torrance Brass Foundry, Torrance, Cal.

(Photograph courtesy of Long Beach Press-Telegram, Long Beach, Cal.)

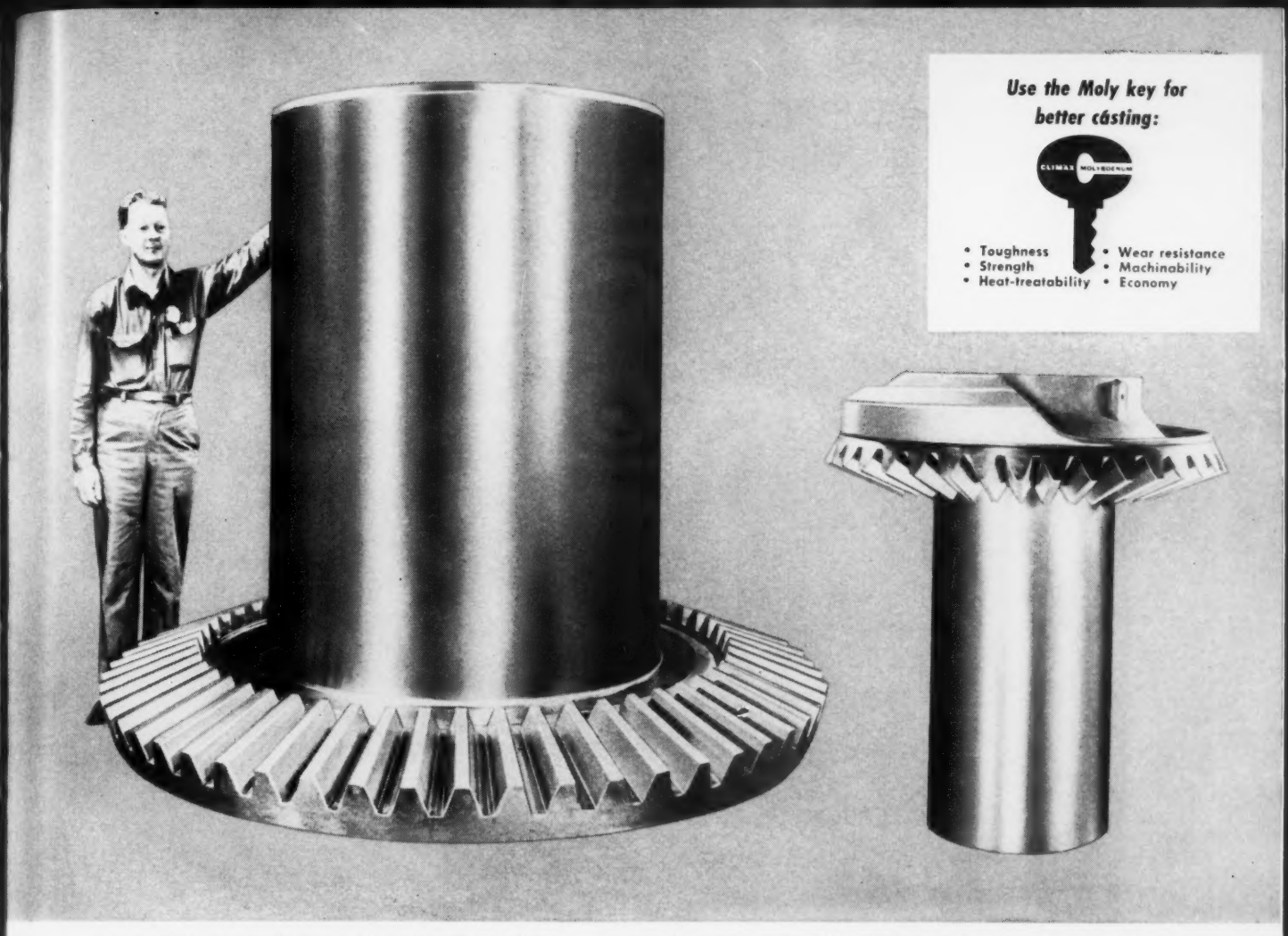
The furnace pictured here is melting aluminum bronze at the *Torrance Brass Foundry, Torrance, Cal.*, operating at a temperature of 2400 F, for the production of high strength centrifugal castings. This unit is rated 100 kw. Note also the clean, smokeless operation as shown in the unretouched photograph.

**SEE US AT THE AFS FOUNDRY SHOW, ATLANTIC CITY, MAY 3-9, BOOTH 1420**

**AJAX ENGINEERING CORP., TRENTON 7, N. J.**

AJAX TAMA-WYATT = INDUCTION MELTING FURNACE

**AJAX ELECTRO METALLURGICAL CORP.,** and Associated Companies
**AJAX ELECTROTHERMIC CORP.,** Ajax-Northrup High Frequency Induction Furnaces
**AJAX ELECTRIC CO.,** The Ajax-Hultgren Electric Salt Bath Furnace
**AJAX ELECTRIC FURNACE CORP.,** Ajax-Wyatt Induction Furnaces for Melting

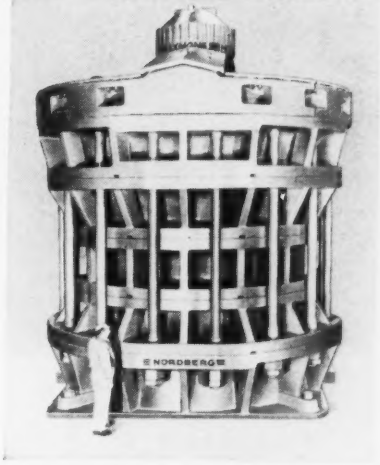



Heavy duty ore crushing machinery is subjected to severe operating conditions. To meet these strenuous requirements the gears shown are made from heat treated low-alloy manganese-*Molybdenum* steel castings. At left: a Symons Gyratory Crusher gear; right: a Symons Cone Crusher gear. Built by Nordberg Mfg. Co.

# Cast Manganese Moly Steel contributes strength and toughness to Crushers built by Nordberg

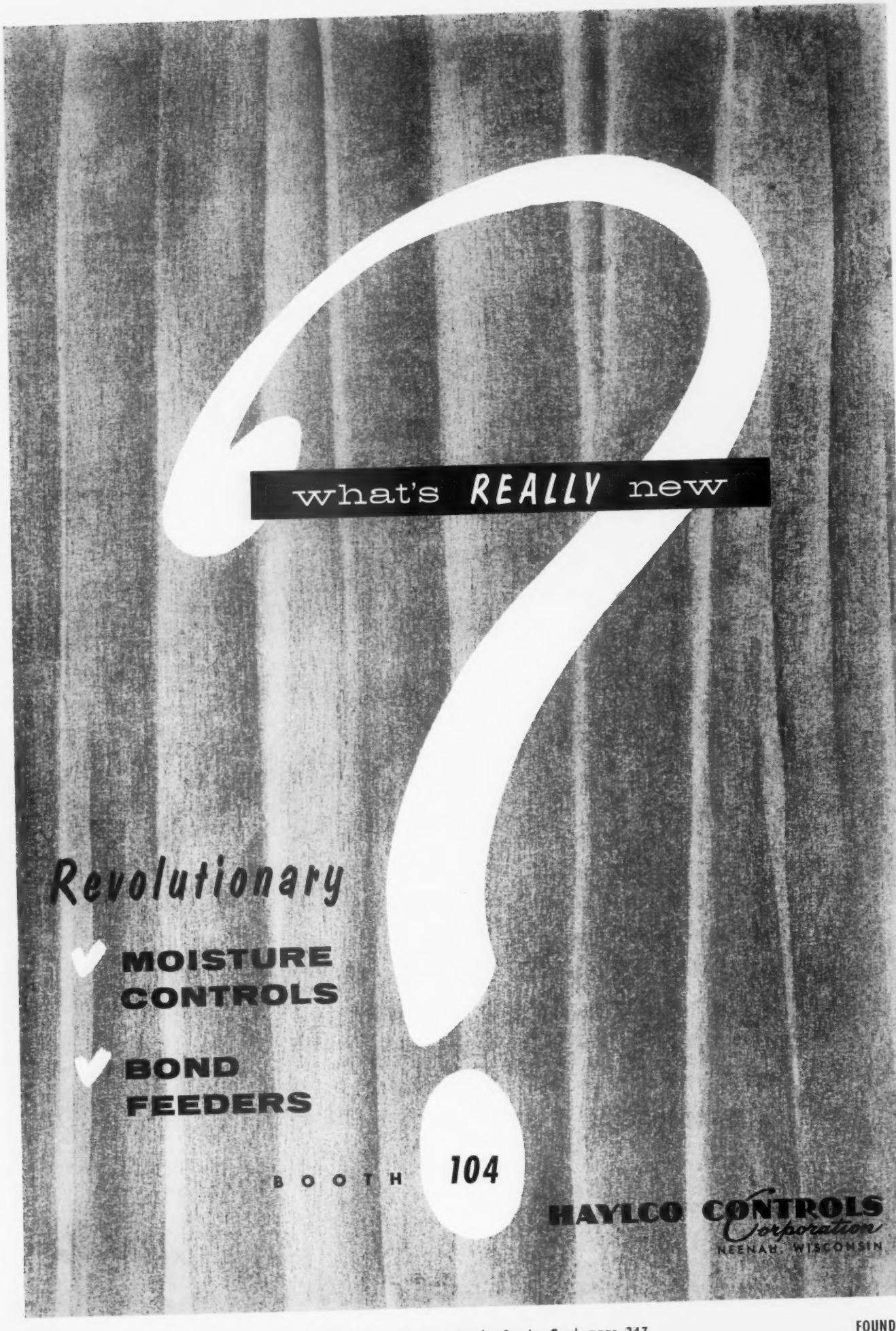
**"Where high strength and toughness are prime considerations," says Howard Zoerb, Consulting Engineer of the Nordberg Crusher Division, "molybdenum bearing steels are specified. This is true of the heavy duty parts of Symons® Crushers, built by Nordberg. These steels have contributed to the Nordberg reputation as producers of dependable, heavy duty crushing machinery."**

Technical assistance is available to foundries on alloying problems. Please address inquiries on your foundry letterhead to: Climax Molybdenum Company, Department MF20, 500 Fifth Avenue, New York 36, New York.



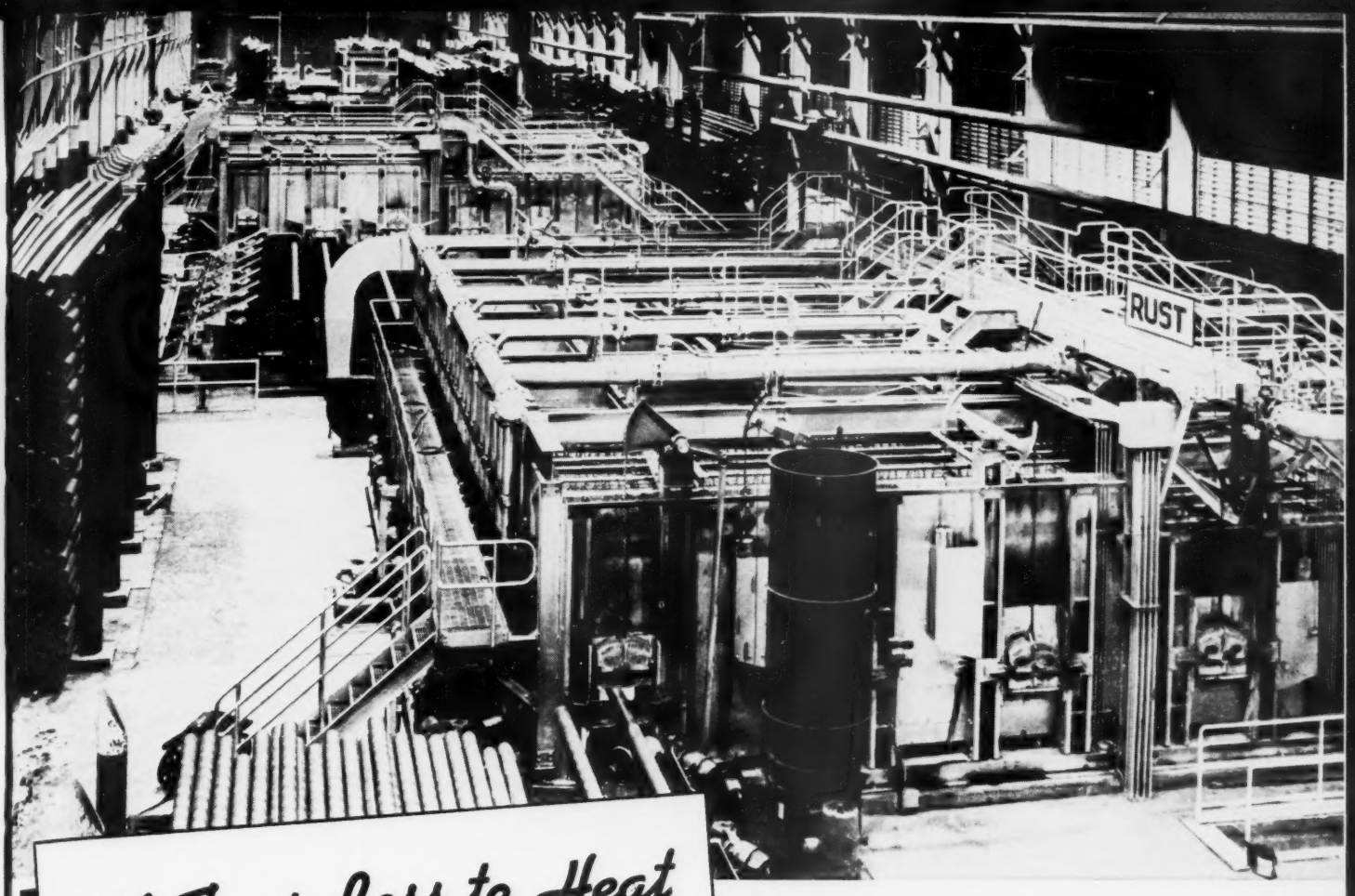

The Symons Cone Crusher is a product of Nordberg Manufacturing Company.

**CLIMAX MOLYBDENUM**






For more information, use Reader Service Card, page 347

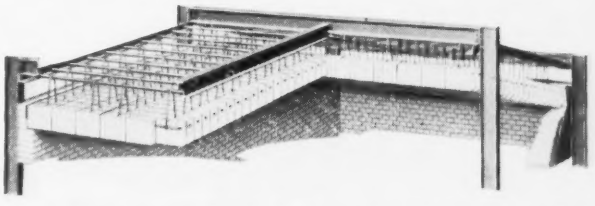



# *116 Tons Less to Heat in this roof*

## because of B&W Insulating Firebrick suspended construction

The new walking beam furnace (shown in photograph above) was designed and constructed by Rust Furnace Company for Jones & Laughlin Steel Corporation. Seamless pipe is conveyed into the furnace, moves slowly from left to right on walking beam rails designed and furnished by York-Gillespie Mfg. Co., and passes out the exit door.

Here's another case where light weight means lower cost. The roof of this walking beam furnace is 2,320 square feet. B&W Insulating Firebrick suspended construction for a 9-inch roof weighs about 30 lbs per square foot, including the weight of rods, hangers, pipe, brick and mortar. This is approximately 100 lbs per square foot less than an arch constructed of heavy firebrick plus insulation having the same heat flow. *This saving means the B&W IFB roof is 116 tons lighter.*



This is a cross-sectional drawing of a typical suspended arch arrangement using B&W Insulating Firebrick. It can be used in flat or sloping roofs, nose arches and many other types of suspended furnace construction.

### Here are the money-saving benefits of B&W suspended construction:

1. Supporting steel is less massive, far less costly. Commercial size steel can be used for roof suspension instead of special castings.

2. B&W Insulating Firebrick heat up and cool down faster. This means lower fuel costs, faster inspection.

3. Furnace temperatures can be changed quickly. When different steels call for different heating schedules, the furnace temperature can be adjusted in minutes instead of hours.

4. Installation costs are lower because these lightweight brick can be handled faster and easier than ordinary heavy firebrick.

For complete information on B&W IFB—the *lightest* weight insulating firebrick, write to B&W today or call your local Refractories Engineer.

**BABCOCK & WILCOX**

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

# YOU'LL DO A BETTER JOB

*with* **H. V. ADAMS DESIGNED**

# HIGH EFFICIENCY FOUNDRY TOOLS

## "UNIVERSAL FREE WHEELING"

**FOUNDRY SAND RIDDLE**

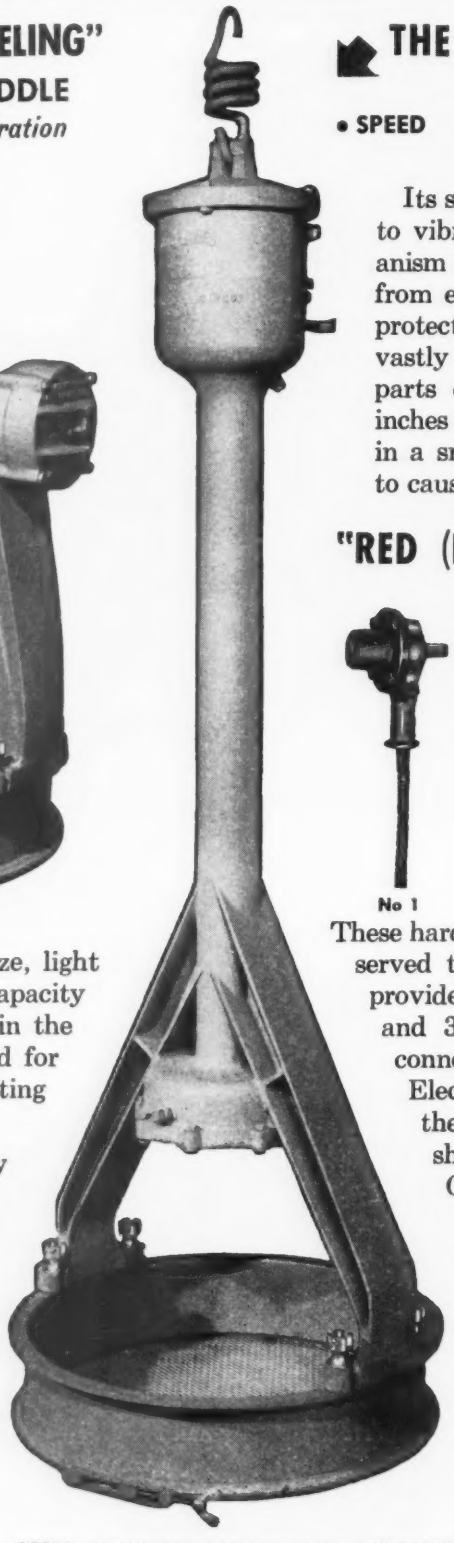
*with the Double Eight Vibration*

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



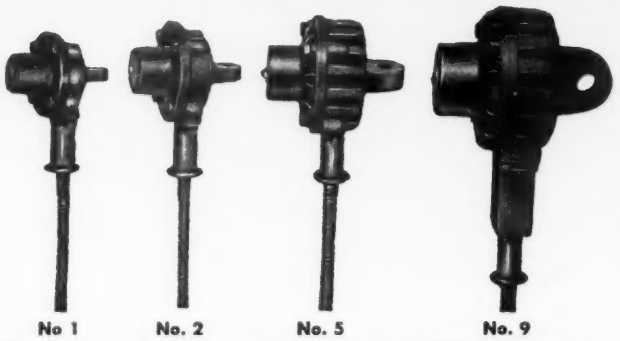
## THE "ROTOPLANE" SPEED SIFTER

*WILL GIVE YOU*

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

## "RED (Devil) ELECTRIC" VIBRATORS



**No 1** **No. 2** **No. 5** **No. 9**

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

### Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

**ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!**

## FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

**2221 Orchard Street - Chicago 14, Illinois**

**Established 1918** **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

# "For 14 Years We've Tested Core Oils But None Have Ever Compared to Cities Service"

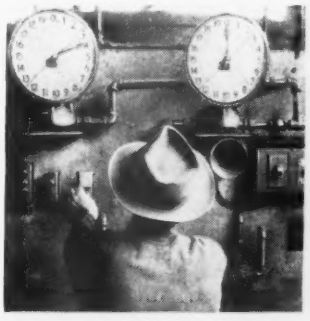
"For 14 years, people have been trying to show us what they felt was a better core oil," says Ralph Melick, Core Room Supervisor of Clio Foundry, Inc.

"And we've listened and looked with open minds—because if there's a better core oil around, we naturally want to know. But never in the past 14 years have we seen *any* core oil that compares with Cities Service Delco #36.

"Delco #36 has all the features we look for in a core oil. Uniformity from order to order . . . low gas content . . . good collapsibility . . . and the quick-drying ability so important to any foundry's production.

"These factors are all the more important when you consider that since 1940 we've had to boost our melting capacity from about one ton a day to 50 tons per day. Under these conditions, we needed perfection in a core oil—and we're happy to say we got it with Delco #36."

Each year, Cities Service receives an increasing number of foundry reports such as this—all praising Cities Service Delco Core Oils. If you'd like to learn the reasons, talk with your Cities Service Lubrication Engineer—the man who's specially trained to help you find the particular kind of core oil for your particular problems. Or, if you prefer, write Cities Service Oil Company, 20 N. Wacker Drive, Chicago 6, Ill.

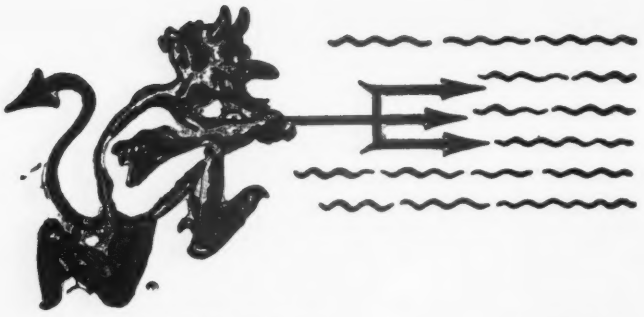


**Automatic Mixing Machine** meters every drop of oil and water used to prepare sand for cores. Clio also uses electronically controlled gas ovens; has boosted daily melting capacity from 1 to 50 tons since 1940.

**Core and Casting**—another job well done. Clio makes numerous types of castings, including "high pressure" castings for the agricultural and automotive fields. They use Cities Service Core Oil exclusively.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



Soffel's

# FLUXES and EXOTHERMIC COMPOUNDS

## for *all* Metals and Alloys

THERMOTOMIC "X" COMPOUND is an exothermic material which is molded and baked into necked down riser cores and inserts. It produces a temperature of 3500° F. and is used as ring inserts under the risers or feeding heads. Great savings are realized through reduced riser dimensions and cleaning costs. In conjunction with Thermotomic Compounds, Carbon Free Liquidizer No. 5 should be used on top of the metal in the heads.

THERMOTOMIC ABC—For aluminum and magnesium castings, necked down riser cores and inserts—prevents piping and shrinkage into castings. Soffel's ALX-31 Liquidizer should be used on top of the metals in the head.

THERMOTOMIC "HoTop" LIQUIDIZER — for short risers—saves 60 to 70% of feeding metal in the heads.

EXOTHERMIC CARBON FREE LIQUIDIZER—A feeding head compound for castings and ingots of ferrous and non-ferrous metals—saves metal and prevents piping and shrinkage.

CARBON FREE LIQUIDIZER AL-X31—For aluminum and magnesium feeding heads—prevents piping.

EXOTHERMIC INSULATING SLEEVE CORE COMPOUND—For riser sleeves—adds heat and prolongs fluidity of feeding metal in heads or risers.

DENSILTITE LADLE FLUX—For iron and semi-steel — reduces sulfur and phosphorus. Adds fluidity and temperature in pouring ladles—produces clean iron.

### SOFFEL'S NON-FERROUS FLUXES

BB-2—For red brass, nickel and tin bronze pressure castings—removes sulfur, iron, phosphorus oxides and gas from brass and bronze.

SUPER BRASS FLUX—For brass and bronze—prevents oxidation of zinc.

BRASS REFINING FLUX—For cupola melting and open flame furnaces — prevents oxidation. Produces liquid slag and faster melting.

COVERALL BRASS FLUX—Removes gas and oxides from yellow brass and nickel silver.

RADIOCLARITE BRASS FLUX—For open flame furnace melting—increases fluidity, tensile strength, removes gas, oxides and iron.

AB-6 BRASS FLUX—For electric furnace melting of brass and aluminum bronze—keeps furnace linings clean.

KLEEN-ALL BRASS CLEANER—For use in bottom of pouring ladles or open flame furnaces to absorb liquid slag and keep the furnace and ladle linings clean.

BRASS ALUMINUM REMOVER — Removes all traces of aluminum from copper, brass or bronze.

HI-LED BRONZE FLUX—Holds lead up to 50% in copper without use of nickel.

NICKEL MONEL FLUX — Removes gas and adds fluidity to metal.

ALUMINUM BRONZE FLUX—A perfect deoxidizer for reducing aluminum and iron oxide in manganese bronze and aluminum bronze. Adds fluidity.

COPPERTITE FLUX—For high conductivity castings—removes cuprous and cupric oxides and gas from copper.

FERRO-OUT IRON REMOVER—Removes free iron or alloyed iron from brass, bronze or copper.

SOFFELITE ALUMINUM FLUX—Removes aluminum oxide and iron from aluminum and increases the fluidity and tensile strength.

MAGNALUM FLUX—For magnesium and aluminum alloys—removes gas and oxide and increases fluidity.

KLEN ZINC FLUX—A deoxidizer and purifier for zinc base pressure die castings—removes gas, sulfur and iron.

DIE COATING—For pressure zinc base die castings —will not scale, blister or create gas in the molds.

PERMANENT MOLD COATING—For aluminum and magnesium castings — adds longer life to molds. Produces clean gas free castings.

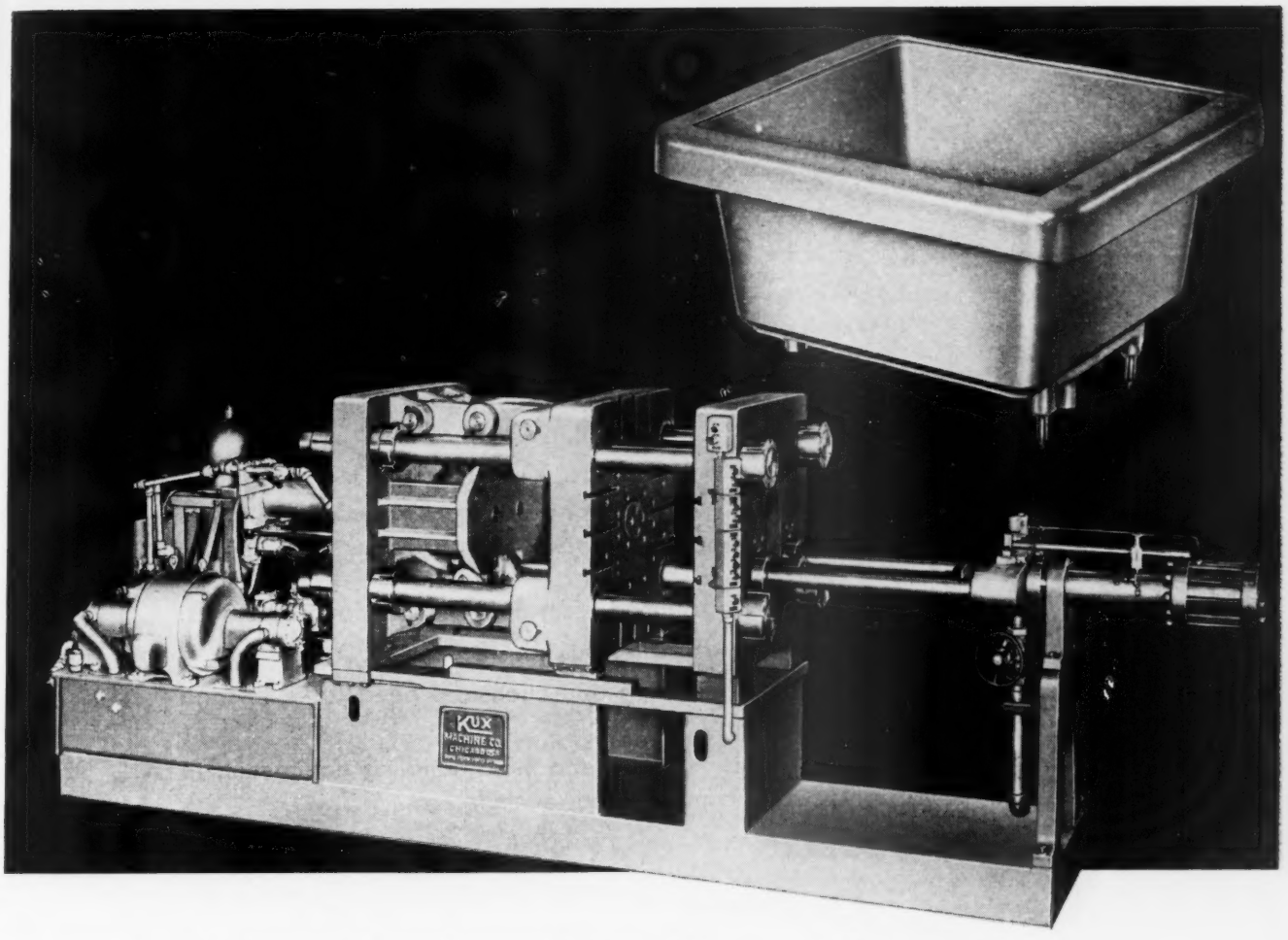
POT COATING—For iron pot melting — increases life of pots. Prevents iron pick up.

U. S. Patents No. 2,490,327 and No. 2,500,097

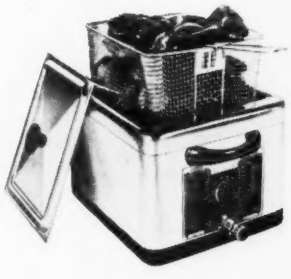
## PITTSBURGH METALS PURIFYING COMPANY

**World's Largest Manufacturer of Fluxes and Purifiers For All Metals and Alloys**

1352 MARVISTA ST., N. S. PITTSBURGH 12, PA.




*to get hardware finish quality castings with cast-in heating elements* **EASTERN METAL PRODUCTS** *chose...*



# KUX DIE CASTING MACHINES

## *for the Alcamatic Cooker and Deep Fry*

"The die-cast well is the heart of our ALCAMATIC Cooker and Deep Fry and naturally must be of top-quality construction," says Mr. Seymour Troy, executive vice-president of Eastern Metal Products Corp., Tuckahoe, N.Y.

"The use of KUX machines (3 in the Forth Smith, Ark., plant and 4 in our Tuckahoe factory), plus our own production processing, enables us to provide the finest aluminum well, making the product an excellent working unit as well as an attractive appliance.

"KUX machines make the difficult problem of cast-in Calrod heating elements easy," Mr. Troy says, "plus cutting our production costs considerably.

"The hardware finish quality castings provided by KUX machines eliminates many polishing and finishing operations and leaves the fry well easy for the housewife to clean."

For the manufacture of electrical appliances requiring dense hardware finish quality castings, KUX die casting machines are unexcelled. Write for our NEW illustrated catalog.

**MODEL HP-37 ILLUSTRATED**

**Hydraulically operated die casting machine for production of aluminum castings.**

**KUX MACHINE CO.** 6725 NORTH RIDGE AVENUE • CHICAGO 26, ILLINOIS



*For more information, use Reader Service Card, page 347*

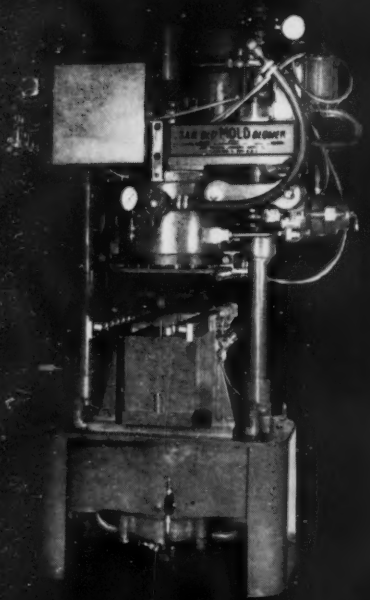
# . . for mold blowing

# it's SAN-BLO®

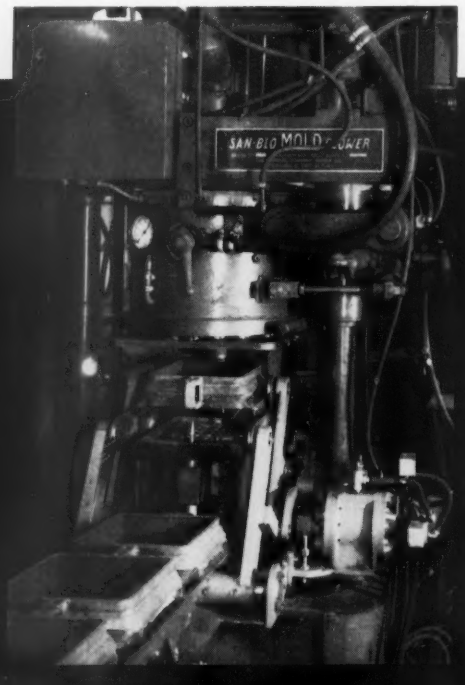
SAN-BLO meets today's foundry-industry-needs for *automation,* as well as *improved quality* of sand molds at *lower* foundry costs . . .

- Uniformly hard molds produced from conventional foundry sands.
- Accurate reproduction of patterns.
- Eliminates separate flask filling operation and need for spill sand conveyor.
- Available with a variety of flask and mold handling equipment, to automatically load and unload the machine.
- Can be used for conventional cope and drag or stack molding.
- Furnished with either manually-initiated or repetitive-automatic controls.

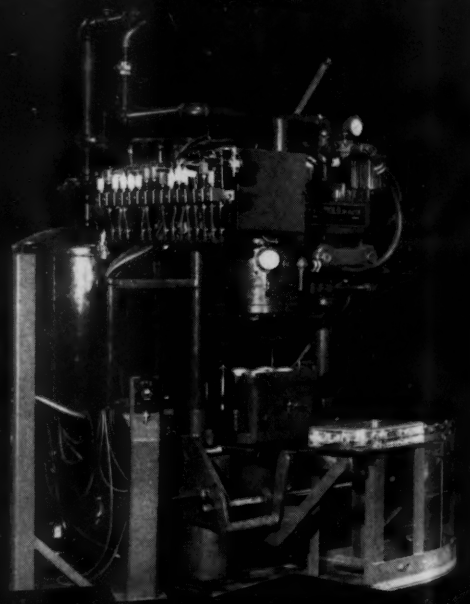
If you are interested in *"tomorrow's automation — today"*, be sure to investigate SAN-BLO Mold Blowing, right now!



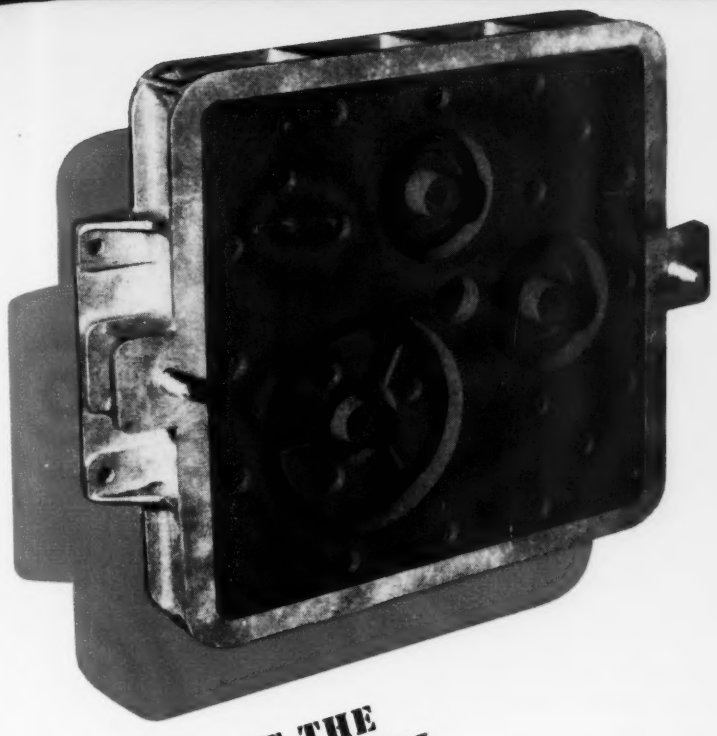
For applications where flasks are rolled through the machine on conveyors.

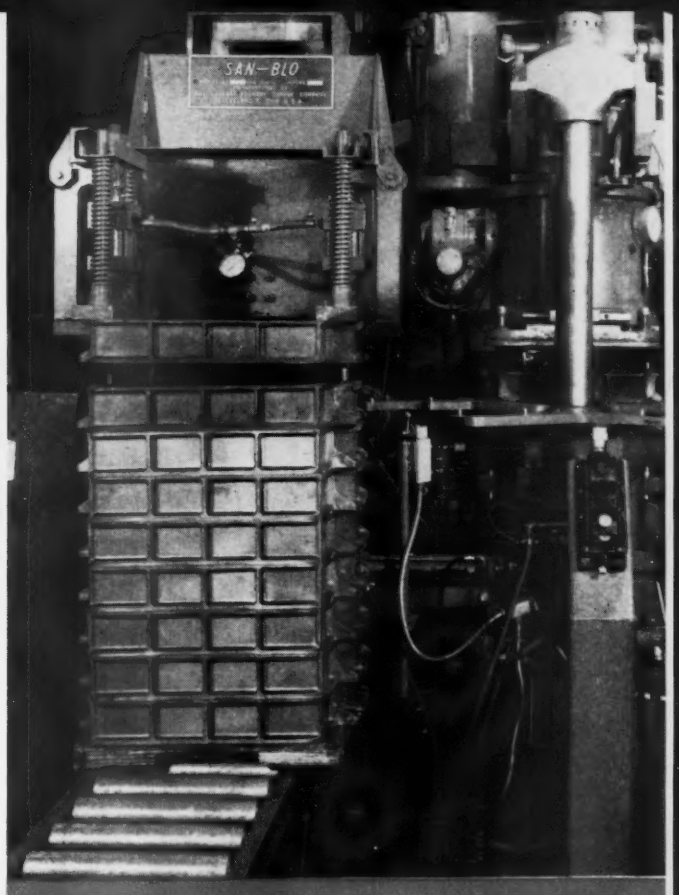



Here a mechanical handling unit moves flasks into and through the machine.

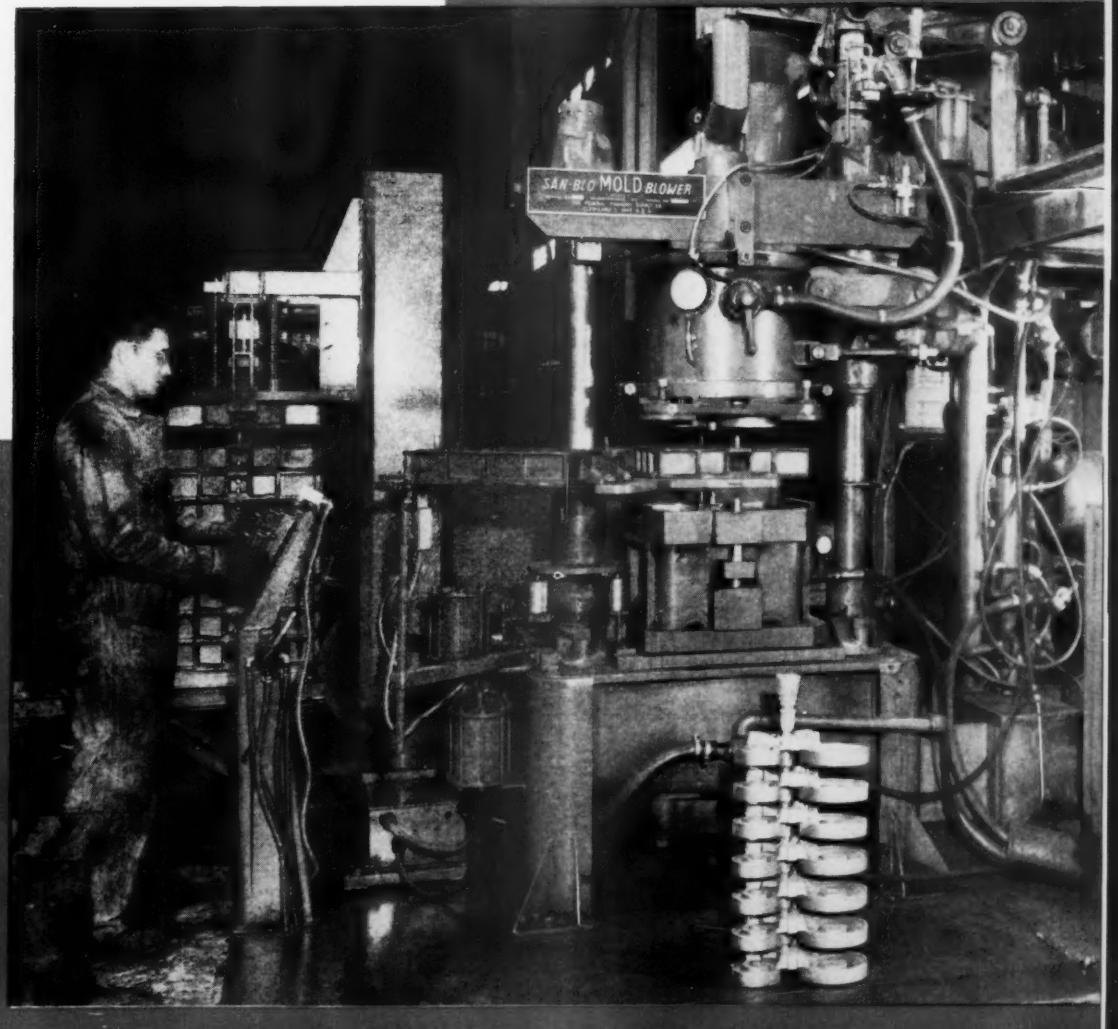


For installations where machine must be loaded and unloaded from same side.






**SEE IT AT THE**
**A.F.S. SHOW**
**BOOTH NO. 1346-48**




MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC.

SAN-BLO mold blower for stack molding. 3-station turn table handles flasks in and out of machine and the automatic stacking unit picks off the blown molds from the turn table and automatically closes them.

*San-Blo Division*

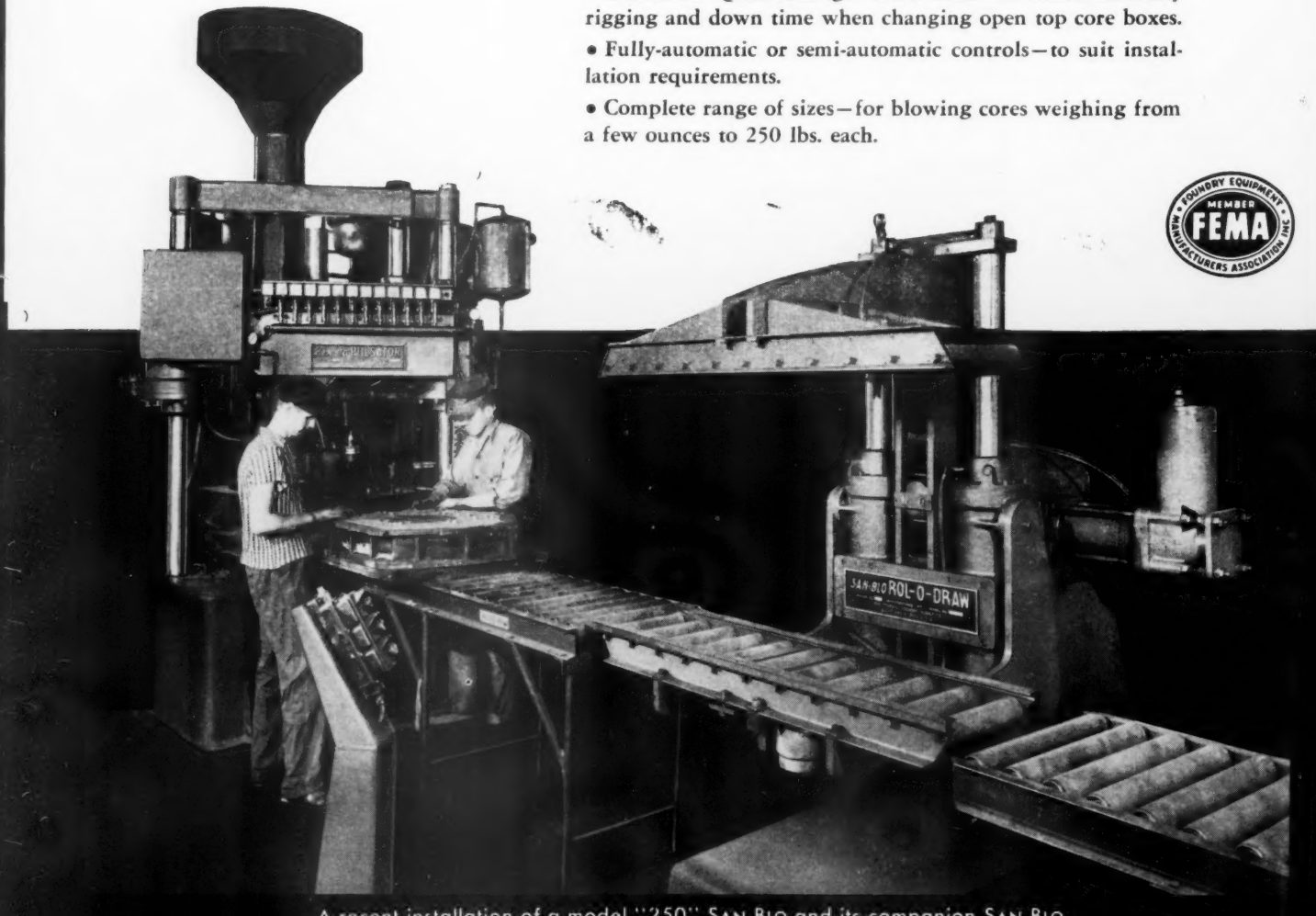
*The* **FEDERAL FOUNDRY SUPPLY** *Company*
4600 EAST 71st STREET · CLEVELAND 5, OHIO

# it's SAN-BLO ..for core making machinery!

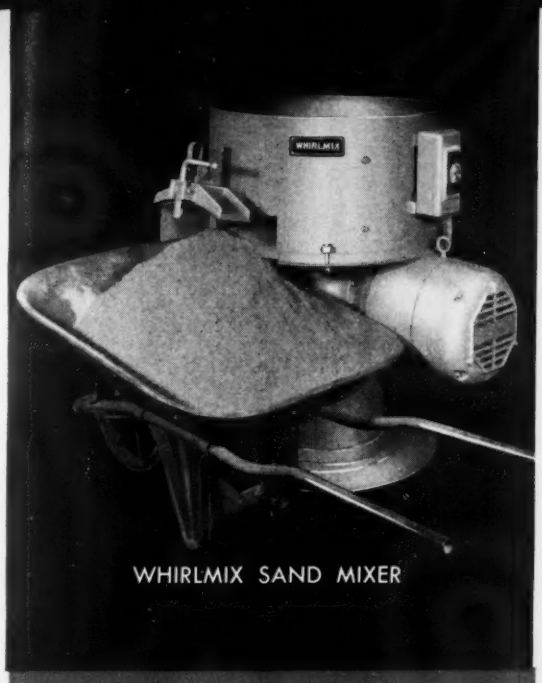
The sensational SAN-BLO core blowers head SAN-BLO's line of core room machinery. These amazingly versatile and efficient core blowers provide the following outstanding features:

- Exclusive sand chamber design, with agitator and aerating blow circuit—for blowing either light or *heavy* sand mixes.
- "Pulsating" blow action—for blowing cores safely in *wooden* as well as metal boxes.
- "LPP" (Low Pressure Prefill)—for holding core box wear to an absolute minimum.
- Universal "Quick-Change" Blow Plate—to minimize costly rigging and down time when changing open top core boxes.
- Fully-automatic or semi-automatic controls—to suit installation requirements.
- Complete range of sizes—for blowing cores weighing from a few ounces to 250 lbs. each.

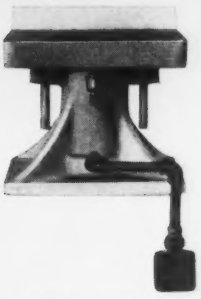
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA



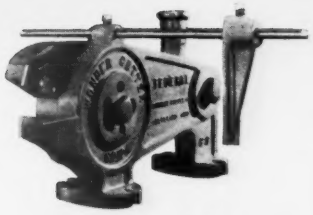

A recent installation of a model "250" SAN-BLO and its companion SAN-BLO ROL-O-DRAW machine for drawing the core box. These two automatic machines form an unbeatable team for the rapid production of large cores.



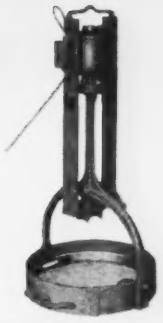
WHIRLMIX SAND MIXER



JOLT MACHINE

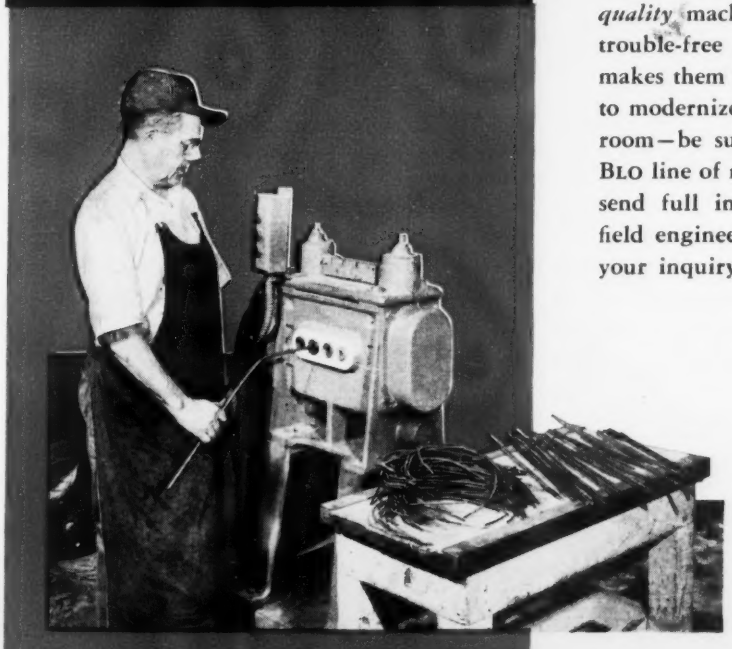


WIRE CUTTER



ELECTRIC RIDDLE

In need of supplementary core making machines? SAN-BLO has them—from fast action sand mixers and jolt machines, to wire cutters and straighteners, electric riddles and core drawing machines. It goes without saying that these are all *quality* machines—built for long, trouble-free service—for SAN-BLO makes them that way! If you plan to modernize or expand your core room—be sure to check the SAN-BLO line of machines. We'll gladly send full information or have a field engineer call, in response to your inquiry.



CLIMAX WIRE STRAIGHTENER

VIBRA-DRAW CORE DRAWER

MODEL "40" SAN-BLO CORE BLOWER

# San-Blo Division

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET • CLEVELAND 5, OHIO

CHICAGO • DETROIT • LOS ANGELES • MILWAUKEE • NEW YORK

# DUST and FUME topics

**WHEELABRATOR CORPORATION** Mishawaka, Indiana

## Complete Control of Cast Iron Grinding Wheel Dust with Wheelabrator® Dustube Collector

Mass production grinding creates tremendous quantities of dust but it is efficiently kept under control at American Foundry Co. This Indianapolis foundry ventilates three swing grinders (illustrated above) that handle 170 automotive cylinder blocks hourly.

Grinding of gray iron, with its high quantity of free graphite, produces very small dust particles. These, if uncontrolled, can float around over considerable distances before settling. American Foundry Co's system of controlling this dust consists of local exhaust ventilation. Each swing grinder has a hood designed to pass air at high velocity to overcome (1) the room air currents and (2) the force imparted to the particles by the grinding wheels. The dust, thus corralled, is carried through a duct from each hood to a Wheelabrator Dustube Collector, where the air is filtered through cloth tubes.

## COLLECTOR KEEPS PLANT FREE OF METALLIC DUST

Metallic dust from a disc grinder, 3 plate polishers, 2 double-stand snag grinders, and 4 double-stand grinders is trapped at its source by hooding in a Wheelabrator Dustube dust collection system at Detroit Michigan Stove Company. The dust collected weekly fills a 2-ton dump truck.

## Eliminate Air Pollution From Electric Furnace Fume

Atmospheric pollution from electric steel melting furnaces need no longer be a problem. Wheelabrator Dustube Collector systems provide virtually complete removal of fume, discharging only clean gas. At Electrocast Steel Foundry Co. a Wheelabrator system keeps 1600 lbs. of dust and fume from the atmosphere every week.

Inside the foundry, the pouring floor is cleaner and working conditions more pleasant. Also, furnace roof life is 20% longer because it is kept clean allowing heat to dissipate properly.

## Dust Control Aids Worker Efficiency Cuts Maintenance

Dust created in various manufacturing processes can be recovered with virtually 100% efficiency in a Wheelabrator Collector. In addition, efficiency of workers improves through better working conditions and maintenance costs are less because dust does not get into machinery.

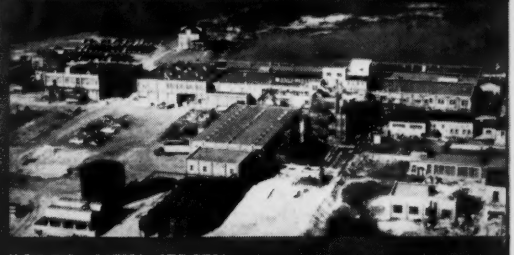
Get the complete story on Wheelabrator Dustube dust and fume control. Write today for Catalog No. 372C.

**WHEELABRATOR**
CORPORATION

505 S. Byrkit Street, Mishawaka, Indiana

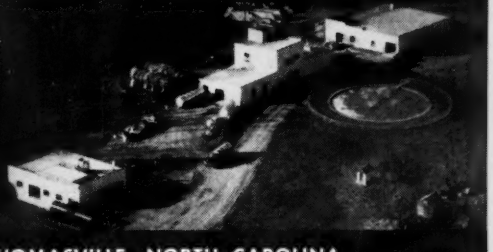
# CATALIN

## UREA AND PHENOLIC Shell and Core Binders



FORDS, NEW JERSEY

CALUMET CITY, ILLINOIS



THOMASVILLE, NORTH CAROLINA

## FAST DELIVERIES!

### From three strategically located plants... Catalin Service *Speeds* Quality—in Quantity!

Catalin, pioneer producer of an extensive range of urea, phenolic, cresylic, resorcinol, melamine and styrene formulations . . . is proud of its product reputation, and prompt service from all three of its modern processing plants: these as pictured hereon are most desirably located in the East, Midwest and South.

For the foundry industry, Catalin produces a group of fast curing, Urea and Phenolic Resins (liquid and powder) as binders for shell molds and sand cores. Serving both ferrous and nonferrous metal castings, these thermosetting formulations are developed to meet specific foundry requirements.

Catalin field representatives, experienced in the problems of the foundry industry, welcome the opportunity to discuss the superior advantages of Catalin Foundry Resins. Inquiries invited!

Catalin

**CATALIN CORPORATION OF AMERICA**
ONE PARK AVENUE, NEW YORK, N. Y.

branch offices:
CHICAGO, ILL., 221 No. LaSalle Street
GREENSBORO, N. C., 630 Southeastern Bldg.



*For more information, use Reader Service Card, page 347*

# LITHIUM

## ...the Miracle Metal

### Over 100 Brass & Bronze Foundries Can't Be Wrong!

Last year over 30,000,000 pounds of copper were degasified with Lithium Metal . . . and the volume is constantly increasing. A little Lithium goes a long way. It's a fact that only 0.005% metallic Lithium makes a sounder, more uniform, nonferrous casting . . . in less time with less trouble and at lower cost.

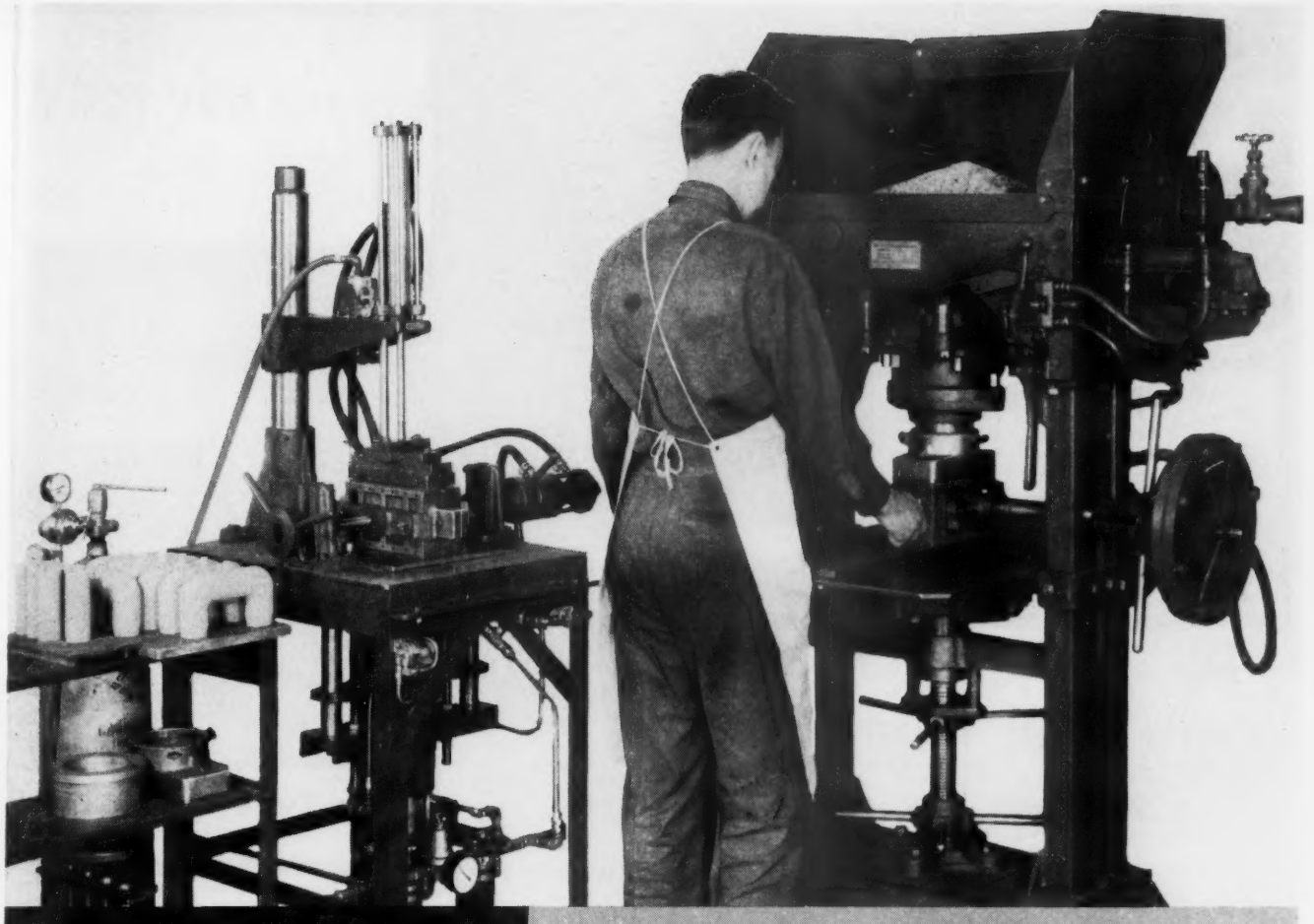
Large size Lithium Cartridges (108 grams) are used for the degasification of large melts of copper including high conductivity metal. Small Lithium Cartridges (2¼, 4½ and 9 grams) are for foundry use in the refinement of high temperature copper, brass, bronze, and nickel-silver castings. Even the salts of Lithium (Carbonate and Chloride, especially) hold great promise for heat treating by reason of their properties in lowering bath melting points.

Is *your* foundry using Lithium? Truly the "ally of alloys," Lithium could hold the same hope for *you*. Look into Lithium. Write for details on actual foundry tests.

*. . . trends ahead in industrial applications for lithium*

LCA **LITHIUM CORPORATION OF AMERICA, INC.**
2600 RAND TOWER
MINNEAPOLIS 2, MINN.

MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, North Carolina • Cat Lake, Manitoba • Amos Area, Quebec • BRANCH SALES OFFICES: New York Pittsburgh • Chicago • CHEMICAL PLANTS: St. Louis Park, Minnesota • Bessemer City, North Carolina • RESEARCH LABORATORY: St. Louis Park, Minnesota



# Redford

## NO. 4 CORE BLOWER with AUTOMATIC $CO_2$ CORE HARDENING STATION

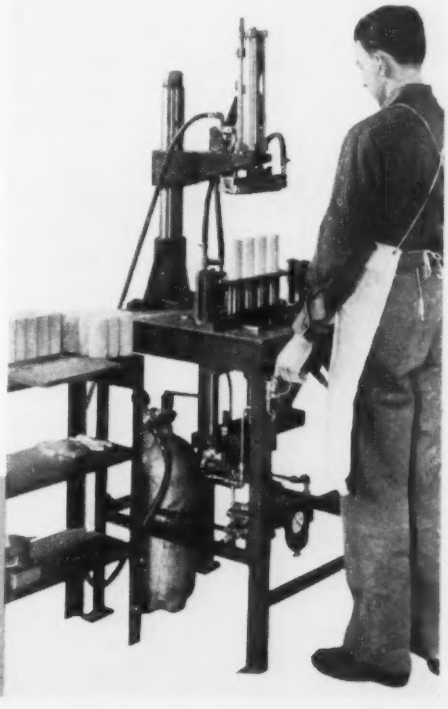
The *right tools* to assure uninterrupted production if you make cores by the $CO_2$ Process.

One core box is being blown while another one is automatically clamped, the cores hardened in the core box and the core box released ready to remove finished cores. If core boxes are suitable, cores can be automatically stripped as shown in the picture at the right.

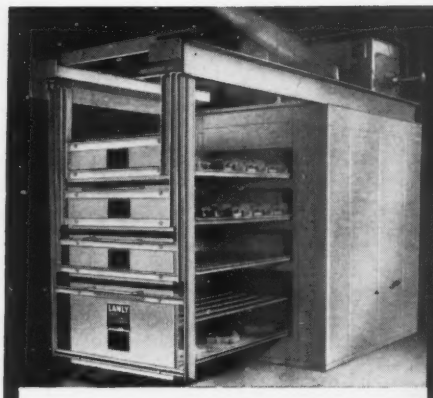
The Core Hardening Station is completely air operated. Automatic time cycle is quickly adjusted to meet job requirements.

Whether you blow cores with conventional sand mixtures or use the new $CO_2$ Process, REDFORD equipment gives you the *best* in over-all performance.

*Booth 1435 at the Show, Atlantic City*

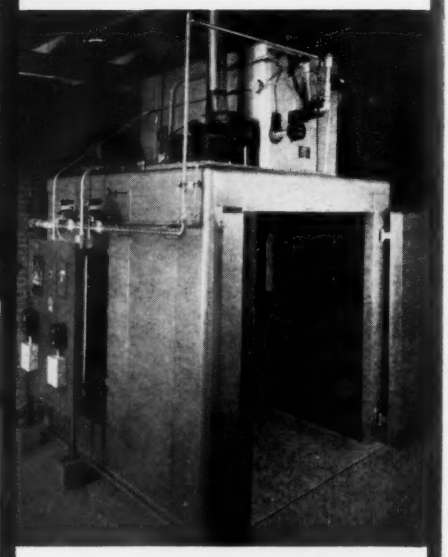


**Redford IRON & EQUIPMENT CO.**
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611



Drawer, . . .

. . . Rack, or



Car Type OVENS . . .

# In your Foundry a

# LANLY

# Installation . . .

*Will aid in . . .*

**Reducing Fuel Costs, Reducing Handling Costs, Improving Production Quality, Increasing Production**

FASTER, BETTER and LESS COSTLY PRODUCTION . . . Time worn words to be sure, but what Foundry today would not welcome this in view of increasing competition, labor costs and more demands upon its facilities.

There is no better time than NOW to examine your production operations.

Check your ovens! Are they fuel eaters, heat losers or core spoilers? Ask the men who operate them!

Chances are you'll find unexpected revelations that will merit a phone call or letter to us.

We'll be pleased to discuss your problems without obligation.

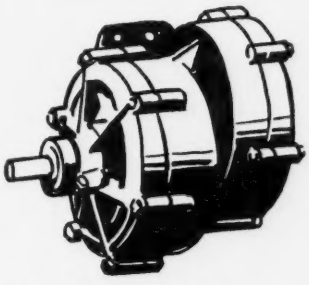
**WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION**

LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

# What you should know about AJAX® LO-VEYORS and how they CONVEY-SCREEN-SCALP-COOL-WASH AND DRY BULK MATERIALS

### DRIVE

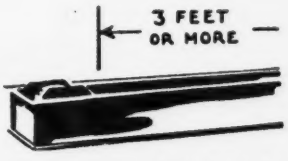
The Ajax-Shaler Shaker imparts a straight line reciprocating force to a suspended or otherwise freely supported body such as a conveying pan or tube, screen, feeder, packer, or any mass which must be vibrated or shaken as part of its function. Reciprocating force is in automatic balance. Anchorage and reinforcing problems are reduced to a minimum. Performance has been proved on thousands of installations on a wide range of equipment for many years.



Drive unit is sealed in oiltight case. No exposed bearings subject to damage under abrasive conditions. Long life and low maintenance cost assured.

Two enclosed revolving weights and the anti-friction bearings which support them are the only rotating parts. All idler rollers, head and tail pulleys are eliminated.

### FOR SHORT OR LONG CARRIES




Ajax Lo-Veyors are made in lengths from 3 ft. up. They can be used for short "feeder" runs and for long carries with two or more units in series.

### LOW HEAD ROOM

Space is saved and installation under floor or overhead is made easy by low height averaging less than 14" except where shaker is mounted.

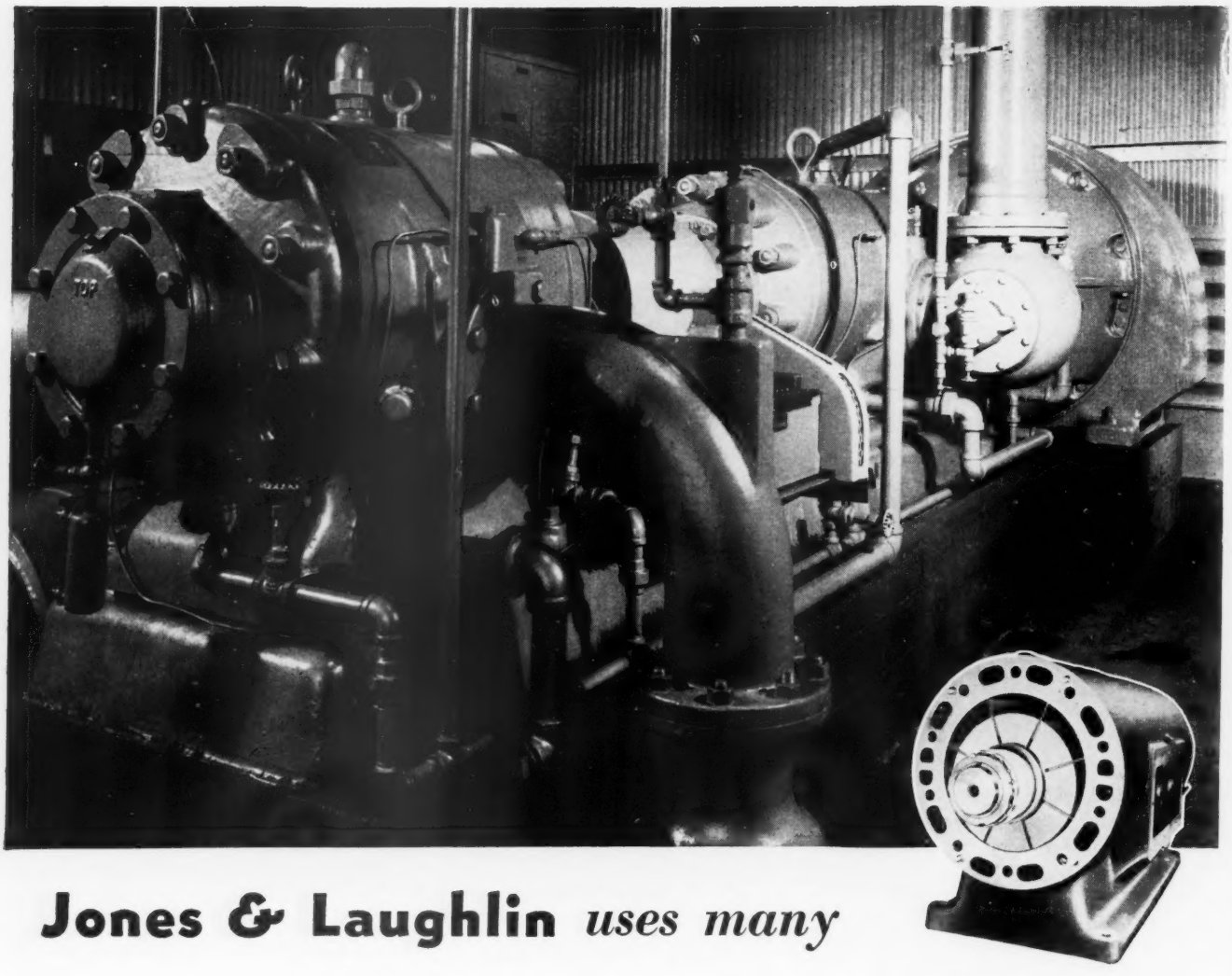
Foundrymen throughout America are turning to Ajax Lo-Veyors for low-cost handling. Whether you are operating a large or small, custom or captive foundry, Ajax Lo-Veyors will cut your non-productive sand handling costs. You will find it good business to have the money-saving facts on how Ajax Lo-Veyors are being welcomed by cost-conscious foundrymen everywhere. Write for Bulletin 39.

## AJAX FLEXIBLE COUPLING CO. INC.

REPRESENTATIVES IN PRINCIPAL CITIES

WESTFIELD, N. Y.

See Ajax Lo-Veyors IN ACTION at the FOUNDRY SHOW



# Jones & Laughlin *uses many* Fuller Rotary Compressors

Like many other steel producers and fabricators, from the East to the West Coast, Jones & Laughlin Steel Corporation has purchased and uses many Fuller Rotaries in its various mills. Illustrated above is a Fuller Rotary Two-stage Compressor, having a capacity of 1660 c.f.m. 120-lb. pressure, installed in the P-1-10″ bar mill of the Pittsburgh Works Division.

Endurance, plus efficiency and maintained capacity, flow of air without pulsations, elimination of vibration, are results of the rotary principle employed in the design of the Fuller Compressor. They can be placed on comparatively light foundations, on balconies or upper floors to save valuable floor space and shorten distribution lines. Employing a minimum of moving parts—rotor, bearings, blades—greatly reduces maintenance and eliminates adjustments entirely.

The cylinders of a Fuller two-stage machine are at ground level, mounted on a common base plate, and are connected by a flexible coupling. Installation is very simple, the motor being lined up to the coupling on the shaft extending from the low-pressure cylinder. This arrangement simplifies motor maintenance work as compared with many other types of machines.

Due to extremely low inertia and $WR^2$, Fuller compressors, which operate in speed ranges of 600 to 1750 r.p.m., according to size, and are directly coupled to the motor, may be installed with either a general purpose or a normal torque synchronous motor, as dictated by size and the electrical requirements of the plant. Standard motors are available for all sizes of Fuller compressors in either squirrel cage or synchronous types.

For full information, write for Bulletin C-5A.

**Fuller**

**FULLER COMPANY, 148 Bridge St., Catasauqua, Pa.**

Chicago • San Francisco • Los Angeles • Seattle • Birmingham

C259
1292

**PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS**

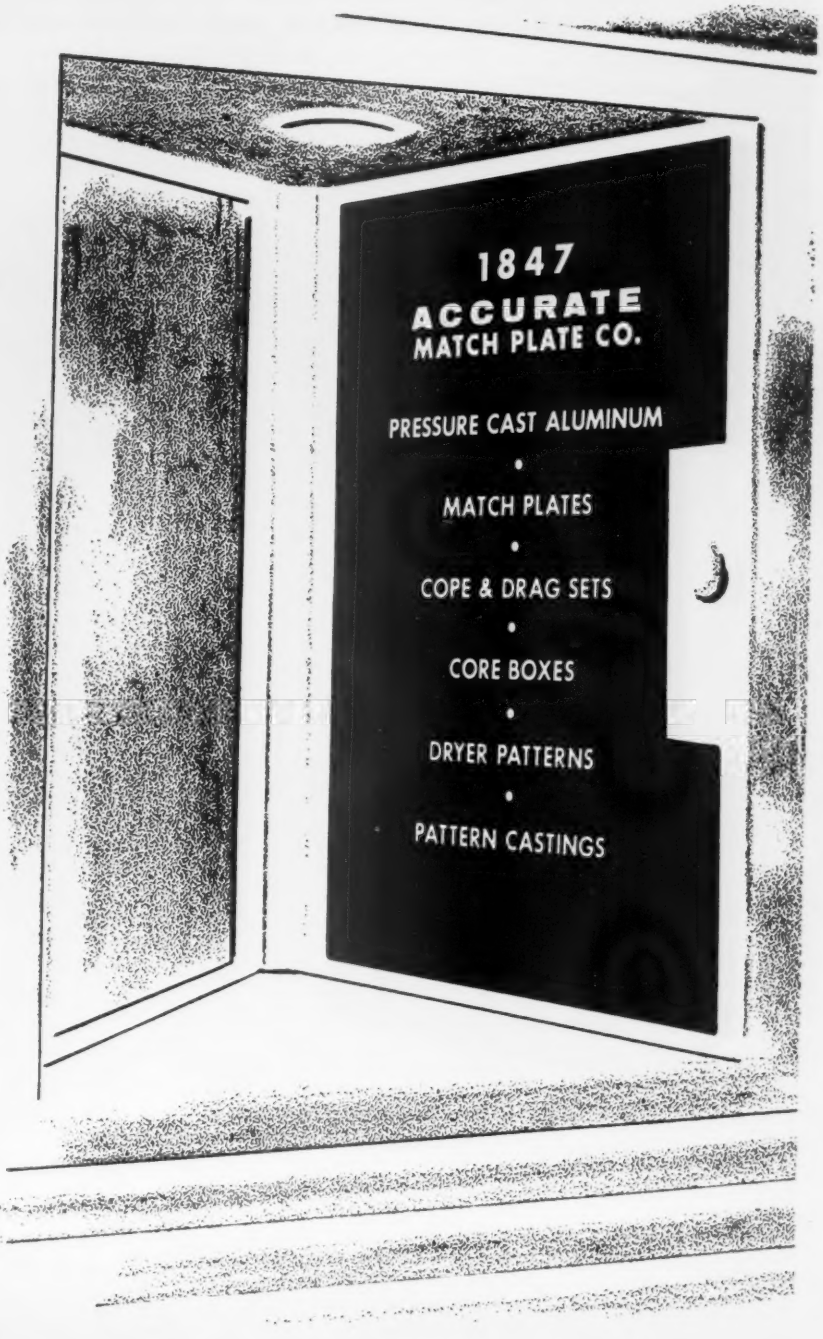
# Open the Door to Greater ACCURACY

**AREA REPRESENTATIVES**

**AUBURN, MASS.**
Henry A. Kottmann
Telephone: Terrace 2-2683

**MILWAUKEE, WIS.**
John M. Donohue
Telephone: Hilltop 2-7130

**LOS ANGELES, CALIF.**
McGowan Company, Inc.
Telephone: Angelus 3-7575




**WRITE FOR PRICE SHEET**

**ACCURATE MATCH PLATE CO.**
1847 W. CARROLL AVE. • CHICAGO 12, ILLINOIS


For more information, use Reader Service Card, page 347

# Considering a fork truck?

**ALLEN SHOVEL ATTACHMENT**

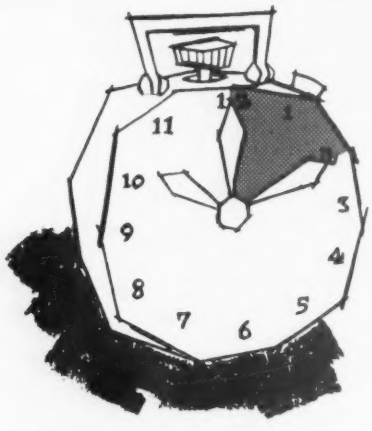
## you can have a "FRONT-END LOADER" too, for LESS THAN $750* MORE!

It's a fact you shouldn't overlook. The comparatively small extra cost of an Allen Shovel attachment *makes your fork truck two machines in one*—a machine for normal tiering and handling operations *and* an efficient machine for handling bulk materials. The truck can be kept busy *all* the time—costly idle time is practically eliminated.

In crowded quarters, particularly, the fork truck shovel is usually more efficient than other bulk handling machines. The shorter length of the fork truck and its narrower width provide a shorter turning radius, greater maneuverability and faster "turn-around". Dumping height is greater, too—a distinct advantage in many operations. Thanks to Allen "straight line" loading thrust, there's no excessive wear and tear on the truck.

**Less than $750 for complete installation on most fork trucks. Includes extra valve, hoses, fittings, etc.*

## FROM FORKS TO SHOVEL—IN A FEW SHORT MINUTES




Quick change-over is an important feature of Allen Shovel attachments. No special skill, no special tools are needed. The job can be done in ten minutes or less—little time is lost from productive work. The Allen Shovel mounts on the fork carriage of the truck. Quick-connecting hydraulic hose couplings help speed the change-over.

You'll find your investment in an Allen Shovel quickly repaid to you many times over. Let us give you the full story.

## SEE THE ALLEN EXHIBIT AT THE FOUNDRY SHOW, BOOTH 1946.

# APPROVED by these leading fork truck manufacturers

**ALLEN SHOVEL ATTACHMENT**

ALLIS-CHALMERS BUDA DIVISION

CLARK®

HYSTER

TRADE YALE MARK
MATERIAL HANDLING EQUIPMENT

TOWMOTOR
THE ONE-MAN-GANG

SILENT HOIST LIFTRUK

MOBILIFT Mobil-Matic

Because these fork truck builders—leaders in the field—give the stamp of approval to Allen Shovel attachments *you* can be sure your investment in an Allen will be a wise one. The ruggedly built fork truck and close-coupled Allen Shovel can handle many jobs too tough for a conventional front-end loader of the same size.

Add to this the fact that fork truck versatility and usefulness is increased tremendously and you can readily see why Allen is the "choice" of fork truck builders and owners alike.

Investigate Allen Shovel attachments for *your* fork trucks—learn some eye-opening facts about Allen performance. Act today.

**ALLEN INDUSTRIAL PRODUCTS, INC.**
**BATTLE CREEK, MICH.**

**America's foremost designers and builders of shovels, snow plows and cabs for industrial trucks.**

**ALLEN INDUSTRIAL PRODUCTS, INC.**
**LIBERTY STREET, BATTLE CREEK, MICH.**

☐ Send complete shovel attachment details.
☐ Send representative.

Name..... Title.....
Company.....
Street..... City..... State.....
Specify make and model of truck.....

*for higher performance it's*

# OHIO MAGNETS

Size for size, Ohio Magnets lift larger loads over longer periods because they *operate cooler*. So for extra magnet lifting power, extra magnet value—always specify Ohio Magnets and Ohio Magnet Controllers. There's a type and size for every lifting job. Send for free copy of Bulletin 112, or consult the Yellow Pages for Ohio offices in principal cities.

AA-1477

**THE OHIO ELECTRIC MFG. CO.**

5400 DUNHAM ROAD • MAPLE HEIGHTS • CLEVELAND, OHIO

ohio ELECTRIC

CHESTER BLAND
*President*

Ohio Also Makes Separation Magnets • Nail Making Machines • Fractional Horsepower, Shell and Torque Motors

# Working AT THE SHOW

ATLANTIC CITY • MAY 3—9, 1956

BOOTHS 1312—1314—1316

That's right! 4 of the world's finest Shell Molding Machines in operation for your inspection.

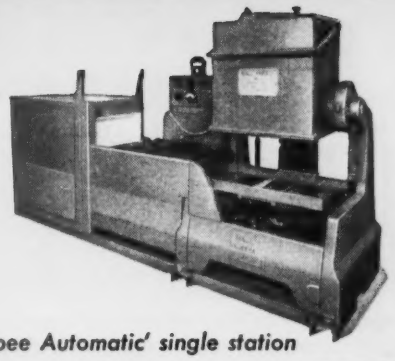
See these most efficient Shell Molding Machines in actual operation at Atlantic City.

**Order Now!** Why wait for the show to get the latest and most productive shell molding team for your foundry! Contact us by phone today—Holyoke, Mass., JE 4-5726.

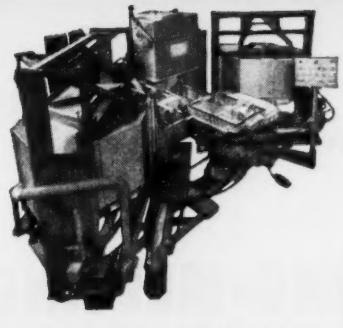
**SHELL PROCESS, INC.**

*Manufacturers of Shell Molding Machines and allied equipment*

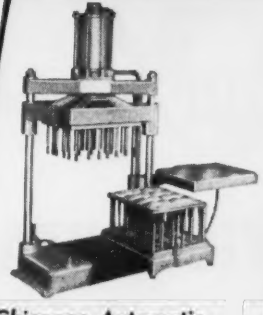
362 McKINSTRY AVENUE, CHICOPEE, MASS.



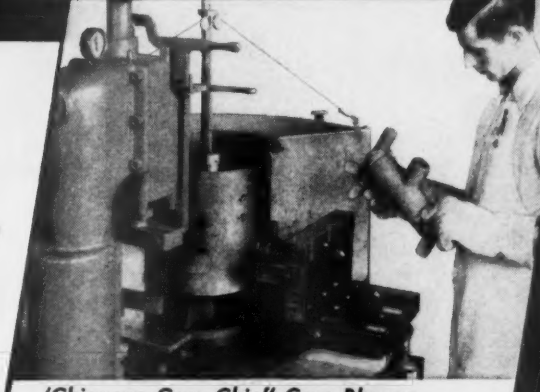
*'Chicopee Automatic' single station*



*'Chicopee Twin' automatic 2-station*

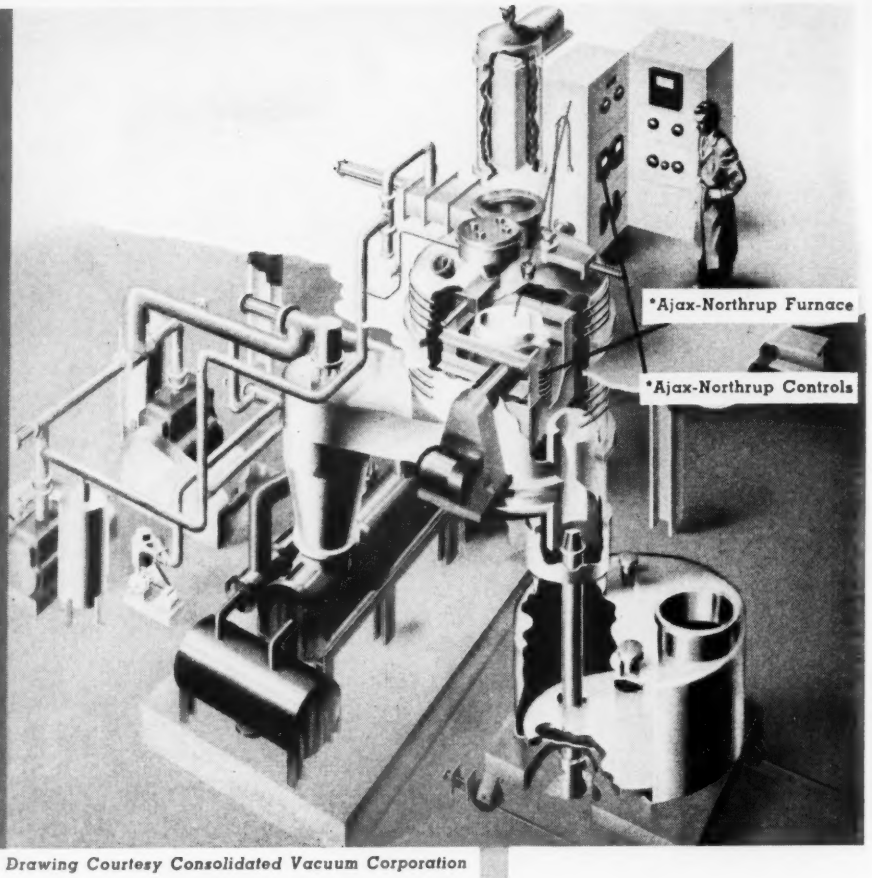


*Chicopee Automatic Bonding Fixture*



*'Chicopee Core Chief' Core Blower*

# nothing new here but the vacuum




*Drawing Courtesy Consolidated Vacuum Corporation*

Take away the tank, a few special vacuum features and pumping equipment from this 1000 lb. capacity vacuum melting installation at the Carboloy Department of General Electric Company, and you have the same high quality AJAX-NORTHRUP furnace used for melting the finest alloys elsewhere at Carboloy and throughout the world. You can depend on AJAX-NORTHRUP furnaces for:

- *A clean melt with consistent analysis*
- *Fast, controlled melting*
- *Almost 100% recovery of scrap*
- *Amazing versatility*
- *No fumes, noise, or external heat*
- *Maximum economy and low maintenance*

*For details write AJAX ELECTROTHERMIC CORPORATION, TRENTON 5, N. J.

No induction vacuum melting installation can be any better than the high frequency induction furnace around which it is built. That's why more AJAX-NORTHRUP furnaces are used than any other for this important work.

*Associated Companies:* Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.

AJAX NORTHRUP SINCE 1916

AJAX

## INDUCTION HEATING-MELTING

*Maplex*

*Plasti-Bond*

*Cupoline*

*Cupolinor*

*Taccone Molding Machine*

*Black Hills Bentonite*

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*DonCO$_2$*

*Triplact*

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# EASTERN CLAY

PRODUCTS DEPARTMENT

*High Temperature Linings*

*Ladle Refractories*

*Revivo Core Paste*

*Revivo Bond*

*Fire Clays*

International MINERALS CHEMICALS

# TACCONE DIAFORM
# MOLDING MACHINE

NEW MODELS

**FOR FLASKS**
**RANGING FROM 12"x18" TO 48"x60"**

★ **The first completely new method of green sand molding in eighty years.**

★ **Designed for all production rates from full jobbing to full automation.**

★ **Uniform mold hardness assures quality castings of *all* metals.**

Diaform molding with the *Taccone Machine* is the first successful use of the diaphragm method of molding in production and jobbing foundries. It provides squeeze pressure from two to ten times that used by previous molding practice and, therefore, completely eliminates the need for jolting. As a result, maintenance of equipment and patterns is drastically reduced and noise can be virtually eliminated.

The diaphragm "contours" around the pattern to eliminate the need for peen blocks, tucking or hand work. The diaphragm produces high-pressure squeeze in all directions—three times the efficiency obtainable with a flat squeeze board. Full high-pressure molding effects are available with ordinary air pressures.

High speed molding is possible with the *Taccone Molding Machine* because of the absence of moving parts such as jolt and squeeze pistons, an important factor, too, in the reduction of maintenance. Many existing units are on full automation. "Push button" molding guarantees repetitive quality with a minimum of supervision. At the same time, the versatility of the diaform principle provides quality in low production and jobbing castings.

There is no substitute for a uniform mold hardness. It is easy to prove that many of the known casting defects are related directly to lack of uniformity. In addition, mold density is a "must" for casting precision whether the problem is dimension control or simply weight control.

*"Precision" green sand castings can be produced only with high-pressure squeeze.*

*High-pressure squeeze can be obtained most effectively with the Taccone Diaform Molding Machine.*

**SPEED . . . QUALITY . . . LOW MAINTENANCE . . . VERSATILITY**

**EASTERN CLAY** PRODUCTS DEPT., INTERNATIONAL MINERALS & CHEMICAL CORPORATION

# PLASTI-BOND

## the only way to combine toughness, flowability, strength and low moisture in a fine sand

High pressure molding demanded properties in a fine green sand which were not available with the known additives. In developing *Plasti-Bond*, these demands were met—the result was "precision" castings in green sand. But *Plasti-Bond* is not confined to high pressure molding. The same properties find applications in every casting requiring improved finish, improved precision or weight control, extended versatility, fast economical cleaning and absence of casting defects.

The unusual properties of green sand with *Plasti-Bond* in high pressure molding enhance the production of small "precision" castings and improve the entire range up to the heaviest castings produced in green sand.

### HOW ELSE COULD YOU—

1. Obtain high flowability in sands with green strength from 12 to 20 psi?
2. Obtain high flowability combined with toughness in excess of 200?
3. Operate 120 A.G.F. sand with 2% moisture or less?
4. Get deep lifts with tough sand with moisture less than 2%?
5. Get hard-ramming and high mold hardness without danger of scabs and blows?
6. Pour brass, bronze, aluminum, gray iron and malleable in the same sand and get smoother castings on all of them?
7. Be able to change from a "tough" sand to a "silky" sand at will, or from batch to batch without changing the type of additive or the base sand?

In addition to improved finish, cleaning and dimensional control on a wide variety of castings, *Plasti-Bond* sand can be used as a "super-finish" additive.

✓ ***Imagine what you could produce in this facing for example:***

| | | | |
|---|---|---|---|
| 83% . . | 135 Mesh Sand | Perm . . . . . | 22 |
| 7% . . | Black Hills Bentonite | Green Strength . . . . | 14 psi |
| 10% . . | Silica Flour | Dry Strength . . . . . | 57 psi |
| 1% . . | Plasti-Bond | Deformation . . . . . | .014 |
| 3.0% . . | Moisture | Toughness . . . . . | 196 |
| | | Rowell Flowability . . . . . | 79 |

# DON $CO_2$

## BINDER AND SANDS FOR THE CARBON DIOXIDE PROCESS

RAMMING THE CORE – 3 MINUTES | GASSING THE CORE – ½ MINUTE | MOLDING AND CORE SETTING – 3 MINUTES | CLOSING AND POURING – 2½ MINUTES

In addition to its use for jobbing core work, dry sand molds and production of cores too large or too numerous for the existing core oven capacity, the $CO_2$ process combines well with the *Taccone Machine* to produce high pressure "cured" shell molds for precision castings.

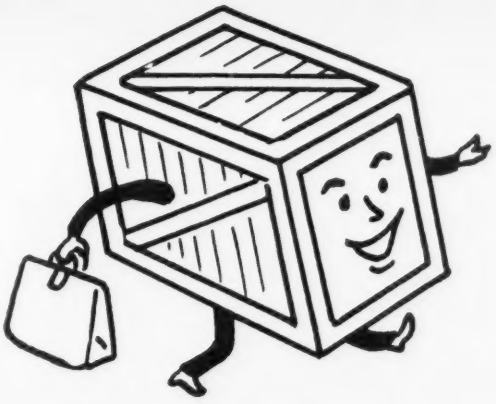
*Plasti-Bond* and *Taccone* combine to make high pressure molding of green sand practical for a wide range of applications. However, some jobs just can't be made in green sand because of erosion or insufficient dry strength for certain shapes and designs. In this case, it is possible to produce a contoured "shell" using the *Taccone Diaform Machine* and *Don$CO_2$* sand in tight flasks. The half molds can be gassed, assembled and poured in a matter of seconds to provide precision castings. *Don$CO_2$* sand is flowable under high pressure squeeze to provide maximum density, minimum bond addition and maximum dimensional control. Fine sands and small additions of *Plasti-Bond* or *Triplact* provide the finish and peel for "super-finish" with the $CO_2$ process for all cast metals.

- ★ **Cores without ovens and dryers.**
- ★ **Dimensional accuracy.**
- ★ **Core box to mold—in minutes.**
- ★ **Dry sand accuracy with green sand speed.**
- ★ **Minimum hooks and wires.**
- ★ **Low gas content.**
- ★ **Low initial cost.**
- ★ **Core production "on the job," as needed.**

**EASTERN CLAY**

**PRODUCTS DEPT.**

**INTERNATIONAL MINERALS & CHEMICAL CORPORATION, GENERAL OFFICES: 20 NORTH WACKER DRIVE, CHICAGO 6**



# IMAGINE OUR SURPRISE!

## . . . we shipped A SALESMAN to MARION MALLEABLE!

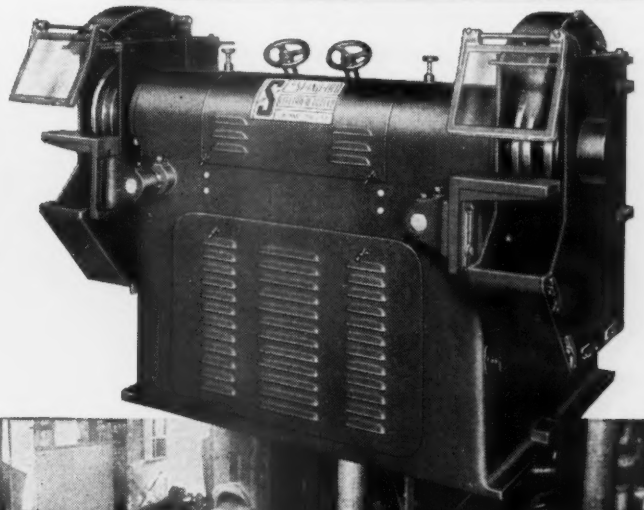
Yes sir, that **FIRST** Standard 35C Infinitely Variable Speed Grinder we shipped to Marion Malleable in Marion, Indiana **SOLD 4 MORE IN LESS THAN A YEAR!** When we asked grinding room Super Harold Williams about it, his answer was short — **and mighty sweet: "WITH YOUR GRINDERS, WHEEL COST IS DOWN AND PRODUCTION'S UP!"**

Here's the way it looks all dolled up in chart form:

| Make of Grinder | Wheel Cost Per Ton | Avg. Hourly Production-Tons |
|---|---|---|
| Brand X | $3.20 | .44 |
| **Sandard No. 35C** | **$1.75** | **.49** |

**IT'S THE STANDARD STORY WHEREVER YOU GO.** Like we said "mighty sweet" **...FOR RAISING YOUR PROFIT CURVE.**

**SUPER SALESMAN!**
The Standard No. 35C
Infinitely Variable Speed
SNAGGING GRINDER



Battery of Standard Grinders, Marion Malleable

Booth 1838 • Castings Congress • Atlantic City • May 3 thru 9

Since 1912

# the STANDARD electrical tool co.

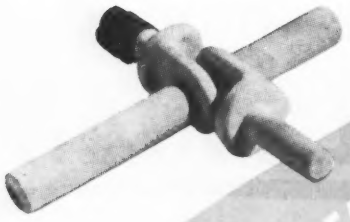
**FOUNDRY GRINDER DIVISION**

**2507 RIVER ROAD • CINCINNATI 4, • OHIO**

HALLMARK OF METALWORKING THROUGHOUT THE WORLD



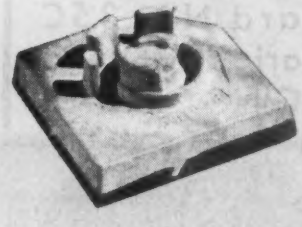
*For more information, use Reader Service Card, page 347*

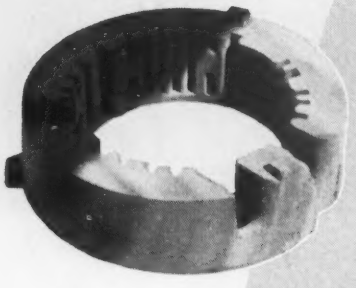


...FASTER PRODUCTION OF FINER-FINISH CASTINGS AT LOWER COST WITH

# DELTA FOUNDRY PRODUCTS

DEVELOPED IN LABORATORY RESEARCH . . . FOUNDRY TESTED AND APPROVED . . . SCIENTIFICALLY CONTROLLED





EVERY DELTA Foundry Product is backed by continuing and exhaustive laboratory research to safeguard quality and maintain absolute uniformity of the finished product. Every step in the manufacturing processes is under strict laboratory control and all raw materials must conform to rigid quality specifications.

Delta Oil Products Co. not only pioneered the development of plastic-type core and mold washes but has continued to lead in the development of new and improved products for the production of better castings — faster and more economically.

Delta sales technicians are ready, at all times, to assist in the more effective and more economical use of core oils, core and mold washes and sand additives for increased efficiency and lower production costs.

## *Get the facts...*

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

## *Visit us...*

AT OUR BOOTH 1525 during the 60th Annual American Foundrymen's Society Convention and also at the Traymore Hotel.

## CORE AND MOLD WASHES:

**FOR STEEL:**

*Special Core and Mold Wash Base
*SteelKoat
*PyroKoat-S
*SuperKoat
*ThermoKoat
*Z-Koat
*ZZ-Koat

**FOR ALL TYPES OF SAND CAST METALS:**

*ThermoKoat
*Z-Koat
*ZZ-Koat
*SuperKoat

**FOR GRAY IRON AND MALLEABLE:**

*GraKoat
*BlacKoat
*SuperKoat
*BlacKoat C-2
*BlacKoat C-4
*DriKoat B-3
*DriKoat B-5
*BlacKoat S-5
*PyroKoat-S
*PyroKoat-G

**FOR NON-FERROUS METALS:**

*NonferrusKoat
*SuperKoat
*GraKoat
*DriKoat F

✻ *A Foundry First — by Delta.*

## PARTING COMPOUNDS:

*Partex
*Super Partex
Liquid Parting
Liquid Parting Concentrates

## MUDDING AND PATCHING COMPOUNDS:

*Sliktite
*Ebony

## MOLD SEAL COMPOUNDS

## *NO-VEIN COMPOUND

## MOLD SURFACE BINDERS—Liquid

## *DRI-BOND

## BONDITE

## CORE ROD DIP OIL

## CORE OILS

## LIQUID RESIN BINDERS:

155-X Fast-Dri
168-X Fast-Dri
191-XX Fast-Dri

## FOR SAND

*Permi-Bond (sea coal replacement)
*Sand Conditioning Oils
*96-B Sand Release Agent

## FOR SHELL MOLDS

DELTA-Dietert Process Binder 103XX
(For "D" process shell cores.)

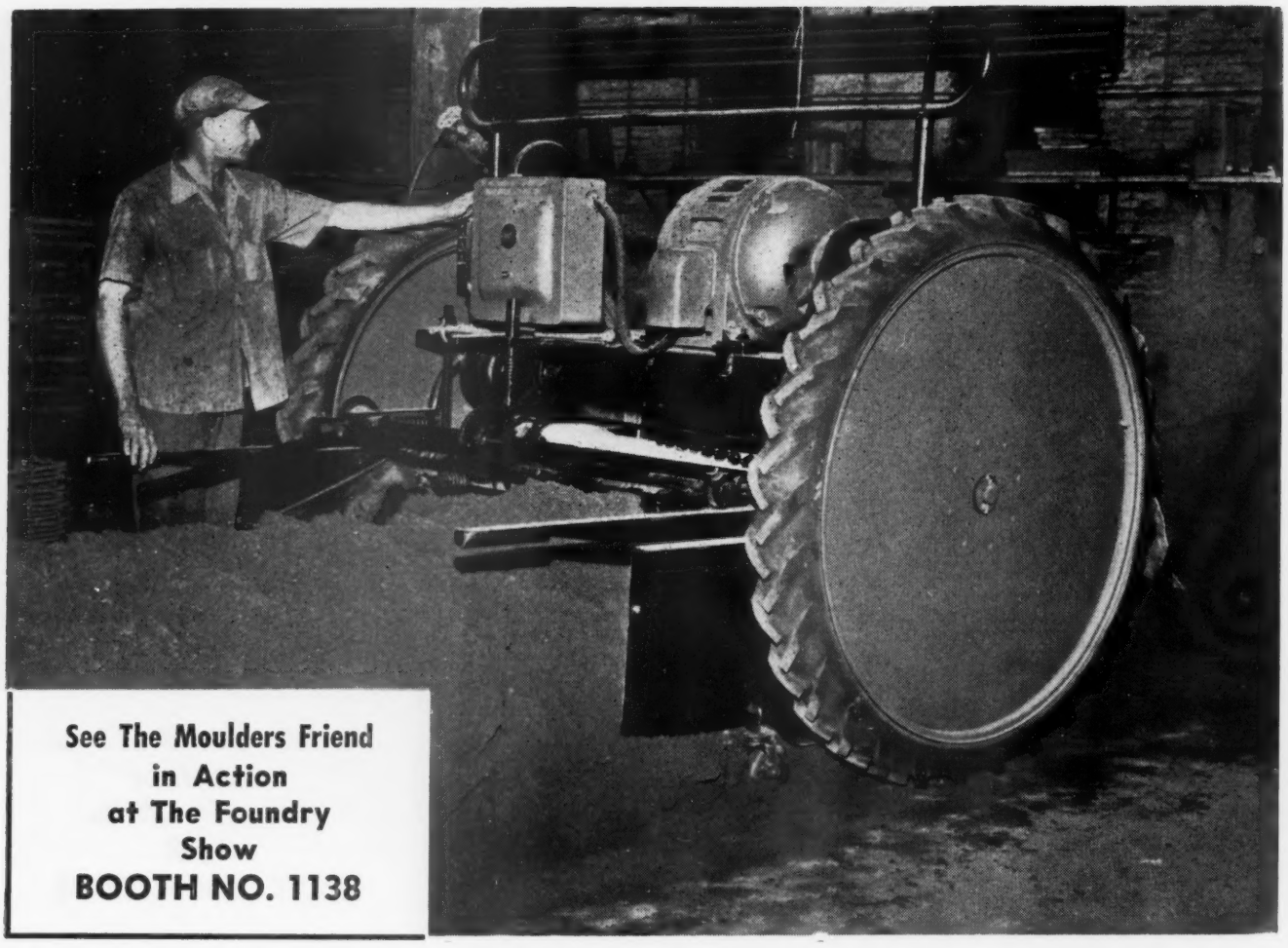
DELTA

**DELTA OIL PRODUCTS CO.**

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

# *The New Moulders' Friend*
# FINDS FRIENDS EVERYWHERE



**See The Moulders Friend in Action at The Foundry Show**
**BOOTH NO. 1138**

MOULDERS like The New Moulders' Friend sand conditioner, because the blending action of the rotary wire brush thoroughly mixes and aerates the sand, making it easier to put up more and better molds.

NIGHT CREWS like it, because it eliminates much manual labor and does a better job of conditioning the sand. With this completely self-propelled machine one man can condition more than two tons of sand per minute.

SAND CONTROL MEN like it, because it does such a thorough job of mixing, moistening and screening that they really can control the sand.

MAINTENANCE MEN like it, because it has few moving parts to keep in order.

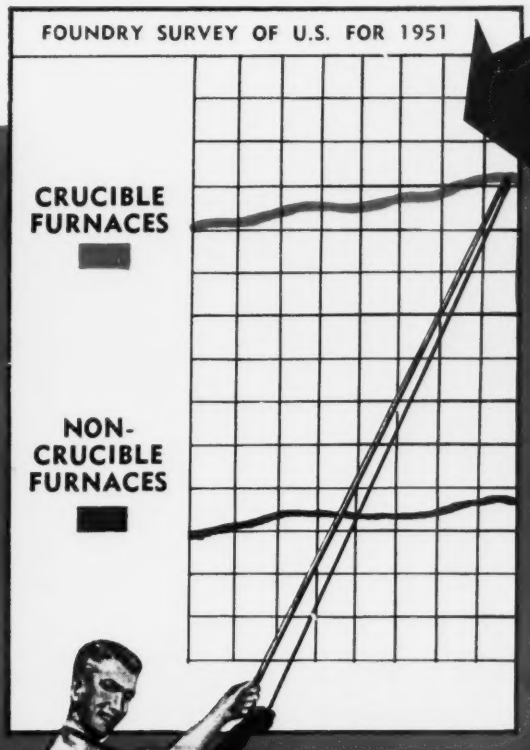
YOU will like The New Moulders' Friend because, it pays for itself quickly with better castings and labor saved.

Investigate The Moulders' Friend today. See one in operation

*"The Moulders' Friend"* — — **Dallas City, Illinois**

# CRUCIBLE MELTING

## ... LEADS three to one



A foundry survey* of the United States for 1952 gives capacity of all Crucible furnaces at 6,043,720 lbs. of non-ferrous metals: all non-Crucible furnaces, capacity, 1,332,585 lbs.

According to the same survey, the total capacity per charge of all Crucible furnaces is rapidly increasing; the latest census shows Crucible furnace capacity at 7,710,000 or an increase of 28%.

Foundrymen know their melting methods. Such persistent popularity and preference result from a combination of advantages obtainable only with Crucible melting.

*"The Foundry Market" Published by Foundry

Have you seen the new " 'CRUCIBLE CHARLIE' says . ." leaflets issued by Crucible Manufacturers Association? If not, ask your superintendent about this. He has a copy.

**CRUCIBLE MANUFACTURERS ASSOCIATION**
11 W. 42ND STREET NEW YORK 36, N. Y.

**THESE FIRMS CAN TAKE CARE OF ALL YOUR REQUIREMENTS FOR CRUCIBLE MELTING**

AMERICAN REFRACTORIES & CRUCIBLE CORP.

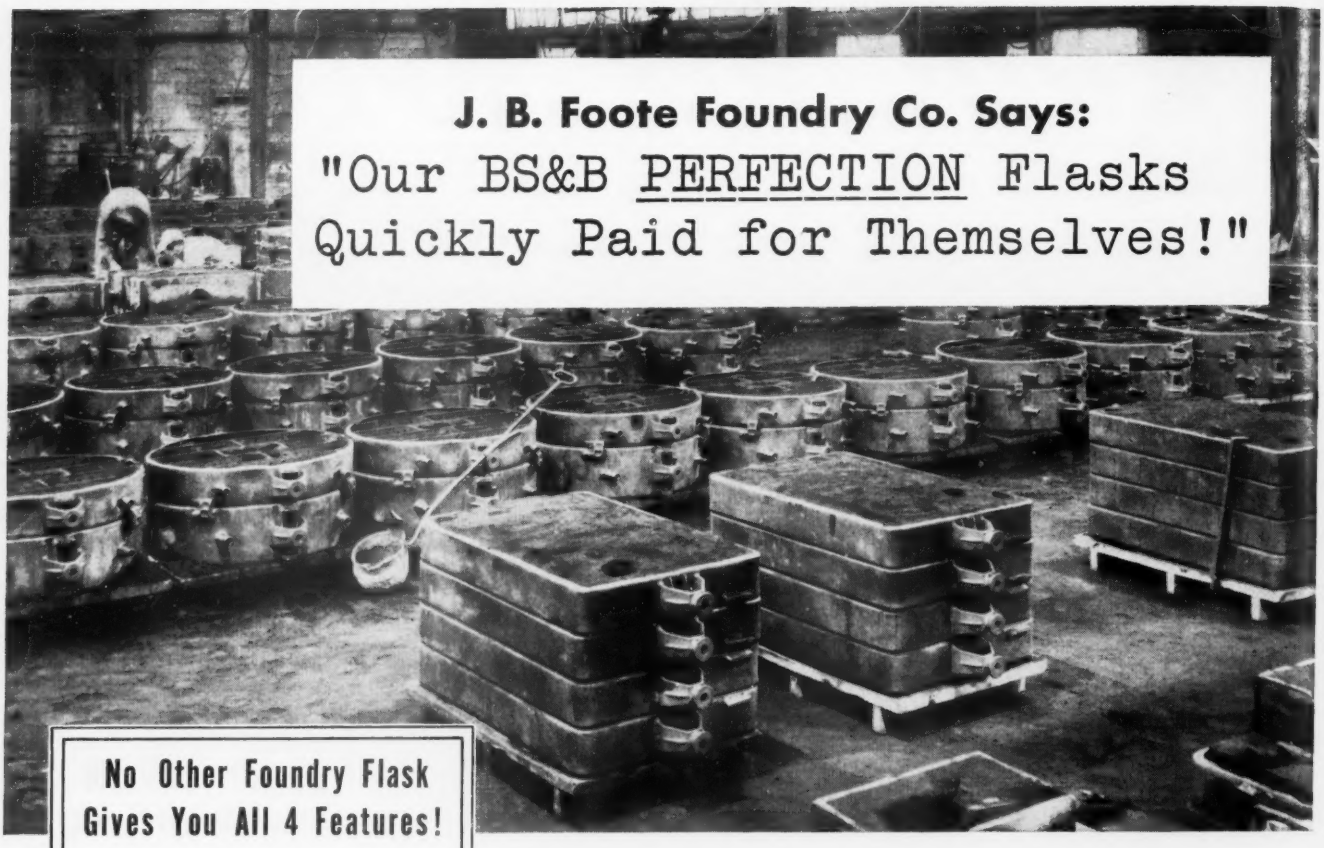
JOSEPH DIXON CRUCIBLE CO.

LAVA CRUCIBLE-REFRACTORIES CO.

ELECTRO REFRACTORIES & ABRASIVES CORP.

ROSS-TACONY CRUCIBLE CO.

VESUVIUS CRUCIBLE CO.

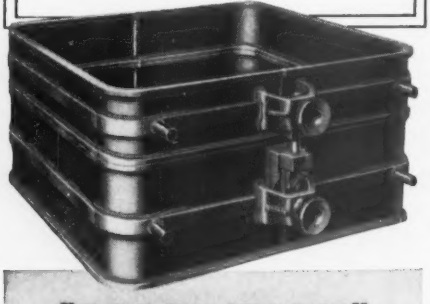


## J. B. Foote Foundry Co. Says:

## "Our BS&B PERFECTION Flasks Quickly Paid for Themselves!"

**No Other Foundry Flask Gives You All 4 Features!**

1. Continuous welding of bearing strips — inside and out.
2. Cast steel trunions.
3. Cast steel pinlugs and clamplugs.
4. Elimination of corner stresses.



**"PERFECTION" Flasks—**

***Designed By Foundrymen For Foundrymen!***

# PERFECTION'S PERFECT FIT AT PARTING ELIMINATES ALL LOSS FROM RUN-OUTS!

In 1951 a small grey iron foundry in Fredericktown, Ohio, set out on a complete expansion and modernization program. Today, that foundry is a modern, completely integrated unit using the latest and best in foundry equipment . . . including BS&B "PERFECTION" Foundry Flasks.

We refer, of course, to the J. B. Foote Foundry Co. which, in addition to manufacturing their own UTILITY MIXER, also does general jobbing business in light grey iron castings for other firms.

Both Mr. Jack Fearn, Vice President, and Mr. Russell Ryan, Foundry Supt., are enthusiastic about the results they're getting from their "PERFECTION" flasks. They like the way these flasks are ruggedly constructed to *eliminate corner stresses*, thereby preventing the corners from cracking and breaking out. They like the perfect fit of "PERFECTION" flasks at parting, which eliminates loss from run-outs. They'll tell you that their "PERFECTION" flasks have more than paid for themselves in a short time, and that they have now standardized *exclusively* on BS&B "PERFECTION"!

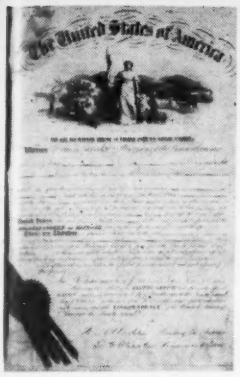
If you'd like more information on how "PERFECTION" Foundry Flasks can help you get better castings at lower cost, we'll gladly send it without obligation. Address your inquiry to . . .

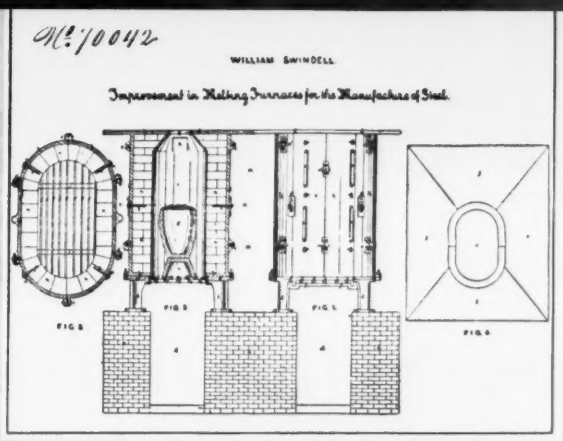
EFFICIENCY · OVER 60 YEARS · BS&B · RELIABILITY · ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

**BLACK, SIVALLS & BRYSON, INC.**

Foundry Flask Division — Dept. 7-AR5

7500 East 12th Street Kansas City 26, Missouri




*An early patent (No. 70,042 U.S. Patent Office) granted to Mr. William Swindell for an improved crucible furnace, for the melting of steel.*

# OVER 105 YEARS

## ... of knowing how

Today's SWINDELL Electric Melting Furnaces, employing the most advanced construction and operating features, reflect in their performance a continuity of steel-melting knowledge and experience extending over 105 years. In fact, a very large American steel producer has been our customer for 103 years. • *Knowing how* is one of the two great qualities in SWINDELL furnace production. The other is integrity. • Let us consult with you.

**SWINDELL-DRESSLER CORPORATION, PITTSBURGH 30, PA.**

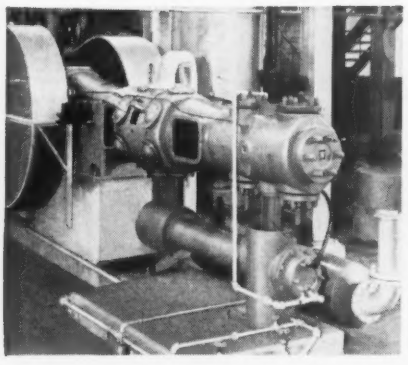
**SWINDELL**

**ELECTRIC MELTING FURNACES**

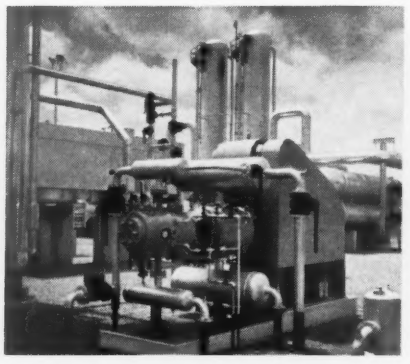
# For jobs like THESE

## CHOOSE HEAVY-DUTY ES COMPRESSORS

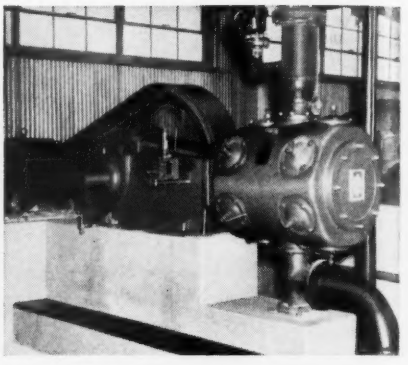
### for pressures to 2500 psi—sizes 5 to 150 horsepower



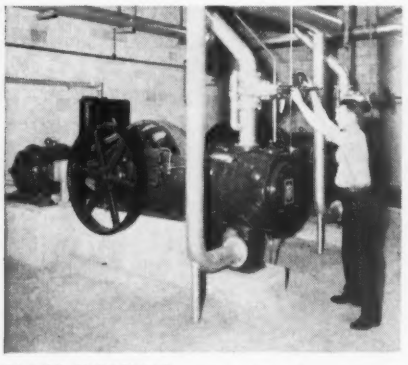
**SOOT BLOWING** The steam power plant of a large paper mill uses this ES to furnish high pressure air for boiler-tube soot blowing. This V-belt driven 125-hp unit compresses air to 350 psi in two-stages.



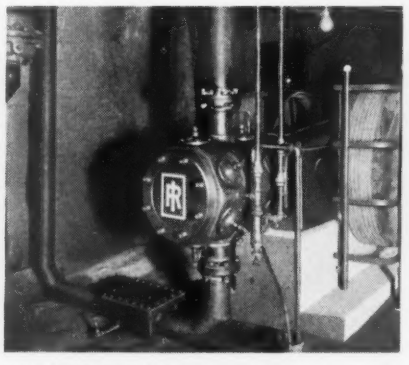
**PROCESS GAS COMPRESSION** In this unique outdoor installation, a two-stage ES compressor with V-belt drive compresses still vapors in a large modern gasoline plant.



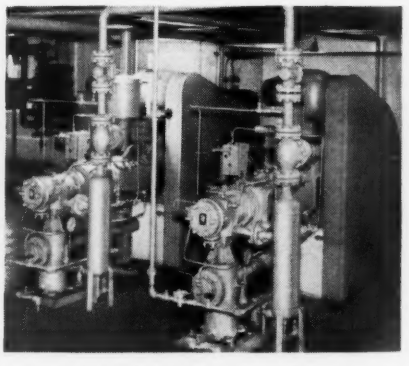
**AIR LIFT SERVICE** Shown here are two of the three Ingersoll-Rand ES compressors installed in a copper mine to provide pressure for elevating acid from the bleaching tanks by the air-lift principle.



**GLASS MOLDING** Here in a large lamp manufacturing plant, two ES compressors supply 50-psi air for cooling gas furnaces and for high pressure gas jets used in glass molding. Pressure is reduced to 30 psi to drive air-motor driven agitators.



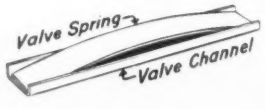
**BOOSTER SERVICE** Installed on the 4600 ft level of a large mine, this Ingersoll-Rand ES compressor boosts air pressure to get full power out of rock drills and other air-powered equipment.



**AIR STARTING SERVICE** A large transcontinental pipeline station uses these two ES compressors to supply 250-psi starting air to its I-R gas engine compressors. Both have overhead motors and one unit is provided with a standby gasoline engine.

SHOWN here are just a few of the countless ways in which Ingersoll-Rand heavy-duty ES compressors are serving industry. A wide range of standard cylinder arrangements and types of drive enables them to meet virtually any operating conditions within their size and capacity limits. Their efficiency is high and operating and maintenance costs low. Ask your I-R representative for help in solving any compression problem.

### Only I-R compressors have CHANNEL VALVES



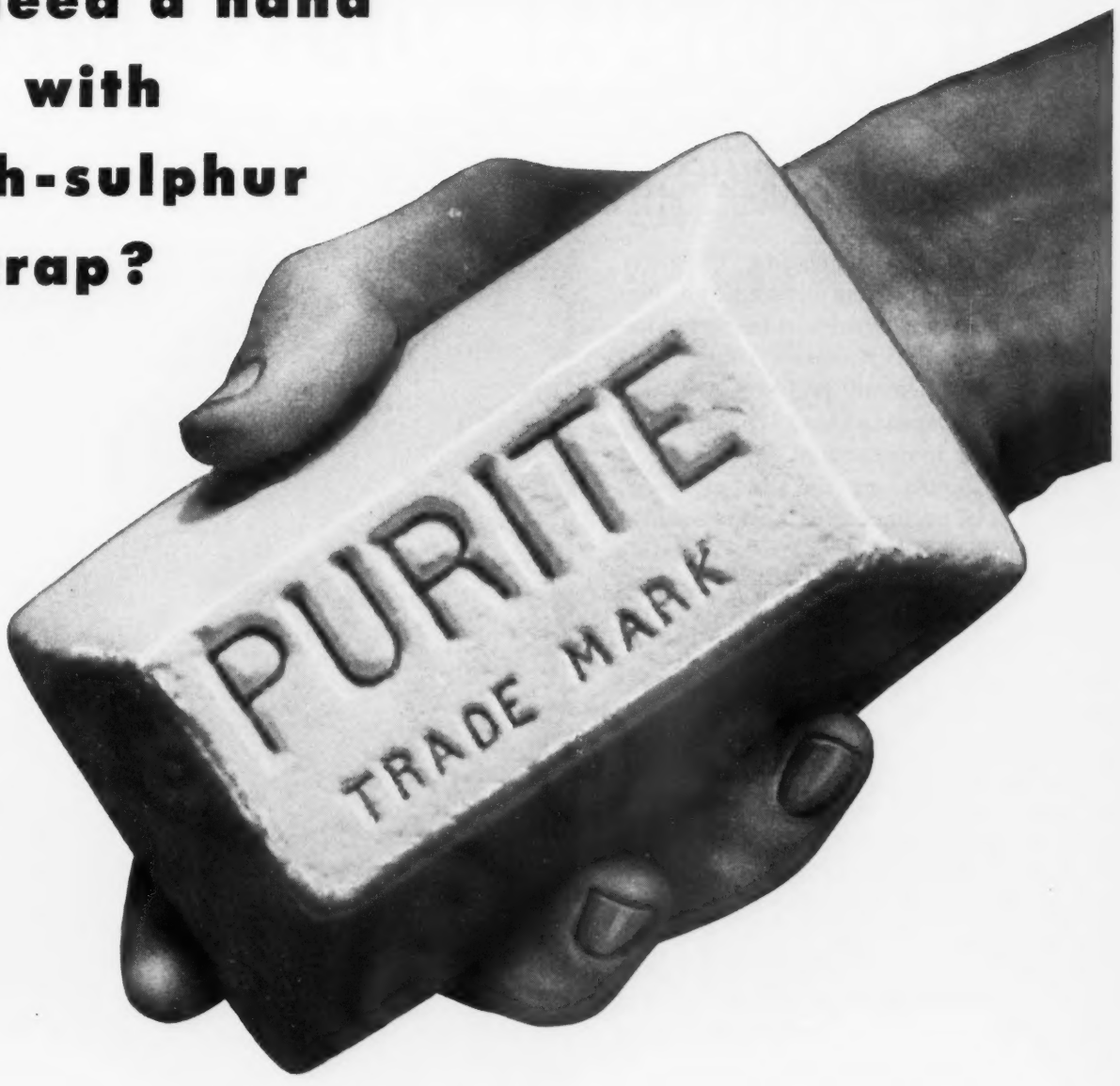

Known for high efficiency, quiet operation and almost unbelievable durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and leaf springs, with trapped-air spaces which give cushioned action.

**Ingersoll-Rand**

1-394 **11 Broadway, New York 4, N. Y.**

**COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS**

# need a hand with high-sulphur scrap?




Your best antidote for high-sulphur scrap is Purite. Used in the cupola and in the ladle, Purite assures cleaner iron and adds to the soundness, strength and machinability of the finished castings.

In the cupola, Purite can produce a sulphur reduction as high as 25% . . . in addition to increasing the fluidity of the cupola slag, speeding combustion reactions, and preventing bridging. In the ladle, Purite desulphurizes the iron to specification and provides clean, quiet-pouring metal of uniform analysis.

For over 30 years, Purite has been the choice of progressive foundrymen. The convenient 2-pound pigs of fused soda ash are familiar everywhere. Purite is distributed by leading supply houses in every area . . . for the name of the one nearest you or further information, write—

MATHIESON

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION • BALTIMORE 3, MD.

3875



For more information, use Reader Service Card, page 347

# NEW FOUNDRY SHOT-COOLING

## *Unique Use of Hewitt-Robins Eliptex*

When the Industrial Engineering Division of Giffels & Vallet, Inc. was planning and engineering a new shell molding plant for the Lynchburg Foundry Company, they naturally had to solve many problems. One was the need for separating about 125 tons of hot shot per hour from castings. The shot had then to be cooled and the sand removed.

For this shot handling they selected a series of Hewitt-Robins Eliptex Vibrating Screens, equipped with heavy-duty stainless steel screen cloth, to air cool and clean the shot without the use of water. The shot after being cleaned on a Hewitt-Robins Eliptex shot cleaner is fed to the cooler screen. Air is passed through the uniform flow of shot at 150 CFM per sq. ft. to cool it from 400° F. to less than 150° F. The screen is designed so that air pull is equal at every point on its surface. Rate of travel and depth of the shot bed can be readily adjusted to meet varying requirements.

Says Irving E. Ingraham of Giffels & Vallet, Inc., "The development of these shot cooling screens marks an important advance in shell molding technology. Although we are very pleased to have been in on the development of their use, full credit for this is due to Hewitt-Robins . . ."

**INDUSTRIAL DIVISIONS**
**PRODUCTS**

CONVEYOR BELTING · CONVEYOR MACHINERY
INDUSTRIAL HOSE · VIBRATING CONVEYORS
VIBRATING SCREENS · DESIGN, MANUFACTURE,
ENGINEERING AND ERECTION OF
COMPLETE BULK MATERIALS HANDLING SYSTEMS
"GLIDE RIDE" THE NEW MOVING SIDEWALK

**HEWITT**

INCORPORATED · EXECUTIVE

G METHOD

ex Screens

T -ROBINS

TIVE

OFFICES: STAMFORD, CONN.

## OTHER HEWITT-ROBINS VIBRATING MACHINERY FOR THE FOUNDRY INDUSTRY

**VIBRATING CONVEYORS.** Will convey practically any substance in almost any form or condition. Has been used extensively as a foundry mold shakeout conveyor with multiple feeds along its length. Available in several widths up to 150 feet in length with only one vibrator.

**VIBRATING FEEDERS.** The first practical, fully mechanical vibrating feeder. Easy to install, operate and maintain. Practically noise-free, with high efficiency and high capacity. Requires no electricals except light-duty plug and receptacle.

**FLOATEX SHAKEOUT.** Made in portable, stationary and mechanical self-discharging types in sizes for castings and flasks weighing a few ounces to flasks weighing 150 tons or more. Full floating principle that shakes the flask—not the foundry. Castings are quickly released along with gaggers, risers and other sand supporters.

**SSC UNIT.** A compact, completely mechanical unit that performs five foundry operations at one time. (1) Flask Shakeout (2) Sand Screening (3) Lump Breaking (4) Conveyor Feeding (5) Tramp-Metal Trapping. Portable, easy to install. Occupies no more space than average-size shakeout.

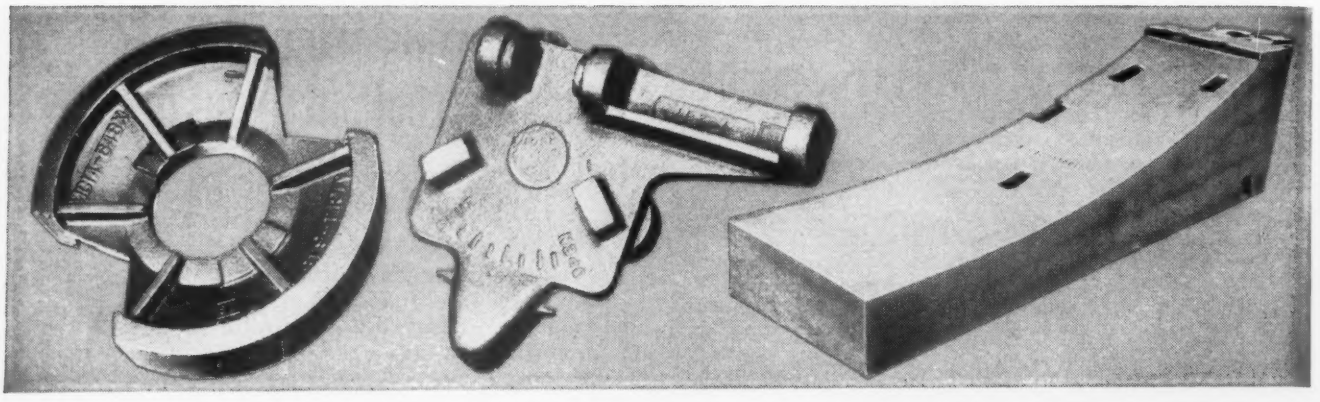
**SCREENS.** A large variety of screens suitable for foundry operations, Gyrex Lumpbreaker Screens, fine mesh Vibrex Screens, high capacity hi-G Screens, and combination screen and feeder units, for any type of sand system.

---

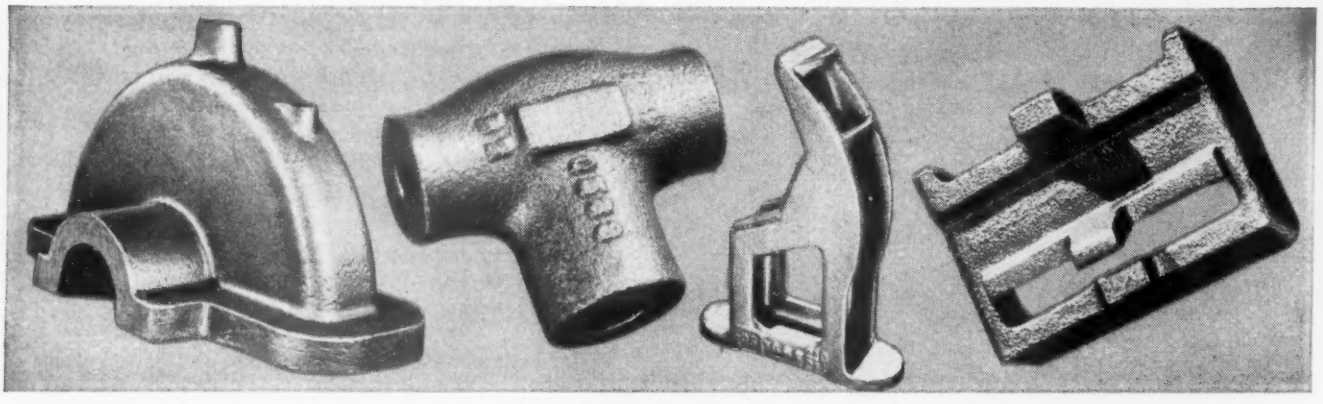
*Don't miss the display of Hewitt-Robins foundry equipment at the 1956 Castings Congress and Exhibit in Atlantic City, May 3-9. BOOTH 1738.*

FOR SERVICE AND INFORMATION ON BELTING AND HOSE CALL YOUR LOCAL HEWITT-ROBINS INDUSTRIAL SUPPLY DISTRIBUTOR LISTED IN THE "YELLOW PAGES"

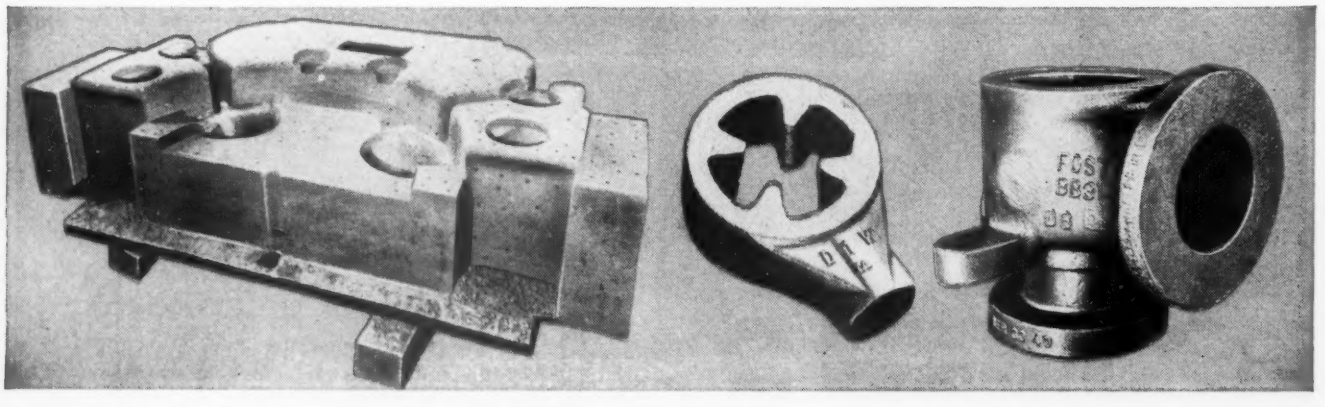
# LARGE OR SMALL, IRON OR STEEL,



# WHEREVER METALS ARE CAST,



# YOU CAN USE TRULINE® BINDER

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*Now!*

# TOCCO* Induction Melting Furnaces for Precision Casting

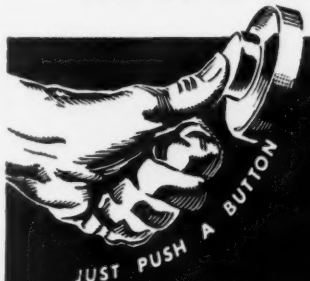
One of the TOCCO Induction Melting Furnaces used at Arwood Precision Casting Co. Note TOCCO control station in background.

● Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! *Look at the advantages:*

- ★ Stepless power control
- ★ Extremely Rapid Melting
- ★ High Efficiency on Intermittent Operation
- ★ Good Mixing because of Natural Agitation
- ★ Extremely Low Alloy Loss
- ★ No Carbon Pick-up
- ★ No Contamination when Composition of Charges is Changed
- ★ High Reproducibility of Results
- ★ Minimum Space Requirements
- ★ No Special Installation Charge
- ★ Simple, Safe Operation
- ★ Clean, Comfortable Working Conditions

If any of these advantages suggest economies in your operations write for full details—no obligation, of course.

**THE OHIO CRANKSHAFT COMPANY**

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**THE OHIO CRANKSHAFT CO.**
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Please send copy of "The Case for TOCCO Induction Melting."

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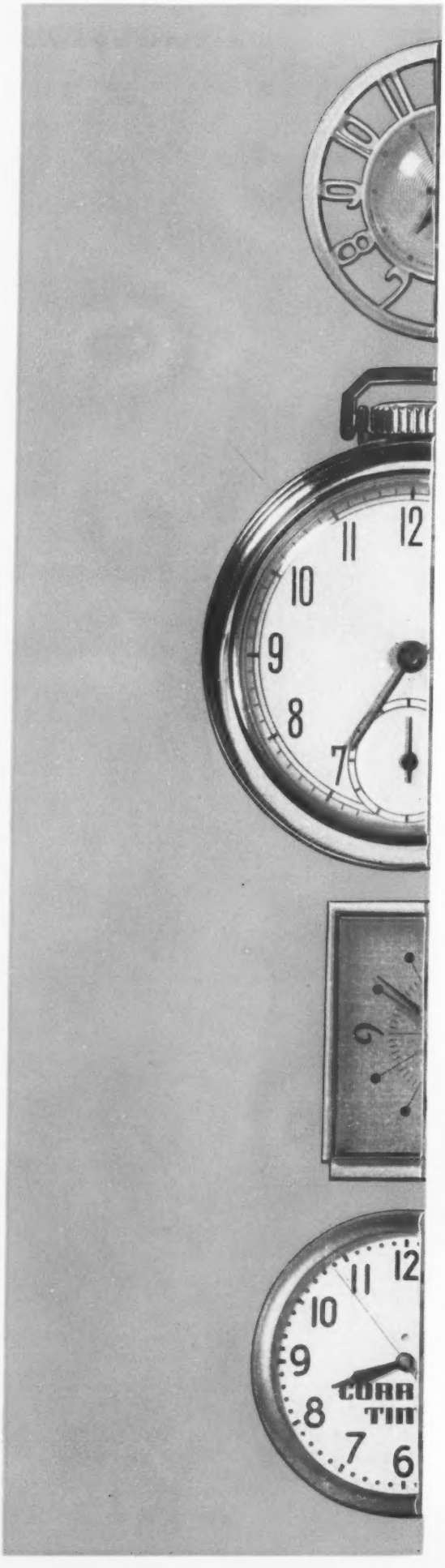

# How to really cut snagging time in your cleaning room!

switch to

# CINCINNATI PD Snagging Wheels

CHECK UP on the amount of time your cleaning room spends in snagging. You may find, like so many foundry men, that wasted snagging time is cutting sharply into your profits. And like more and more foundries every day, you'll want to switch to CINCINNATI (PD)° SNAGGING WHEELS—the greatest grinding wheel development in years.

CINCINNATI (PD) WHEELS will absolutely cut snagging time in your cleaning room . . . saving you money four important ways:

- FASTER CUTTING – You can get more pounds of metal per hour with the grains and bonds specified by CINCINNATI for your jobs. Operators like the fast, easy cutting action of CINCINNATI (PD) WHEELS.

- SELF-DRESSING ACTION – The CINCINNATI (PD) WHEELS specified for your job by CINCINNATI abrasive engineers require few, if any, dressings. With the right grade wheel, new cutting grits are bared as soon as old grits get dull and inefficient.

- LONGER WHEEL LIFE – Through longer life of CINCINNATI (PD) WHEELS, users have reported almost *double* the production per wheel. One customer, using a portable grinder, gets almost *twice* the life with a CINCINNATI (PD) Flared Cup. Another user, snagging cylinder blocks on a swing frame, has increased the production per wheel 45% with (PD) WHEELS.

- POSITIVE DUPLICATION (PD) – "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *Yet these better, cost-cutting* CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

We'll be happy to prove to you how CINCINNATI (PD) WHEELS can increase your production and cut time and costs in your cleaning room. Just contact us and we'll send one of our representatives. Wire, write or telephone, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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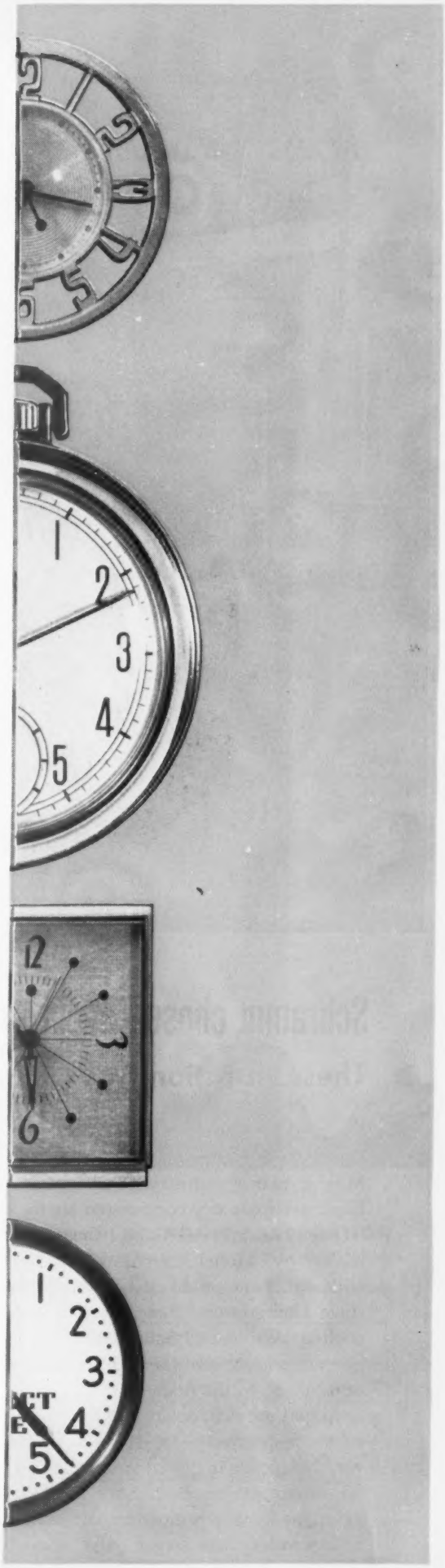
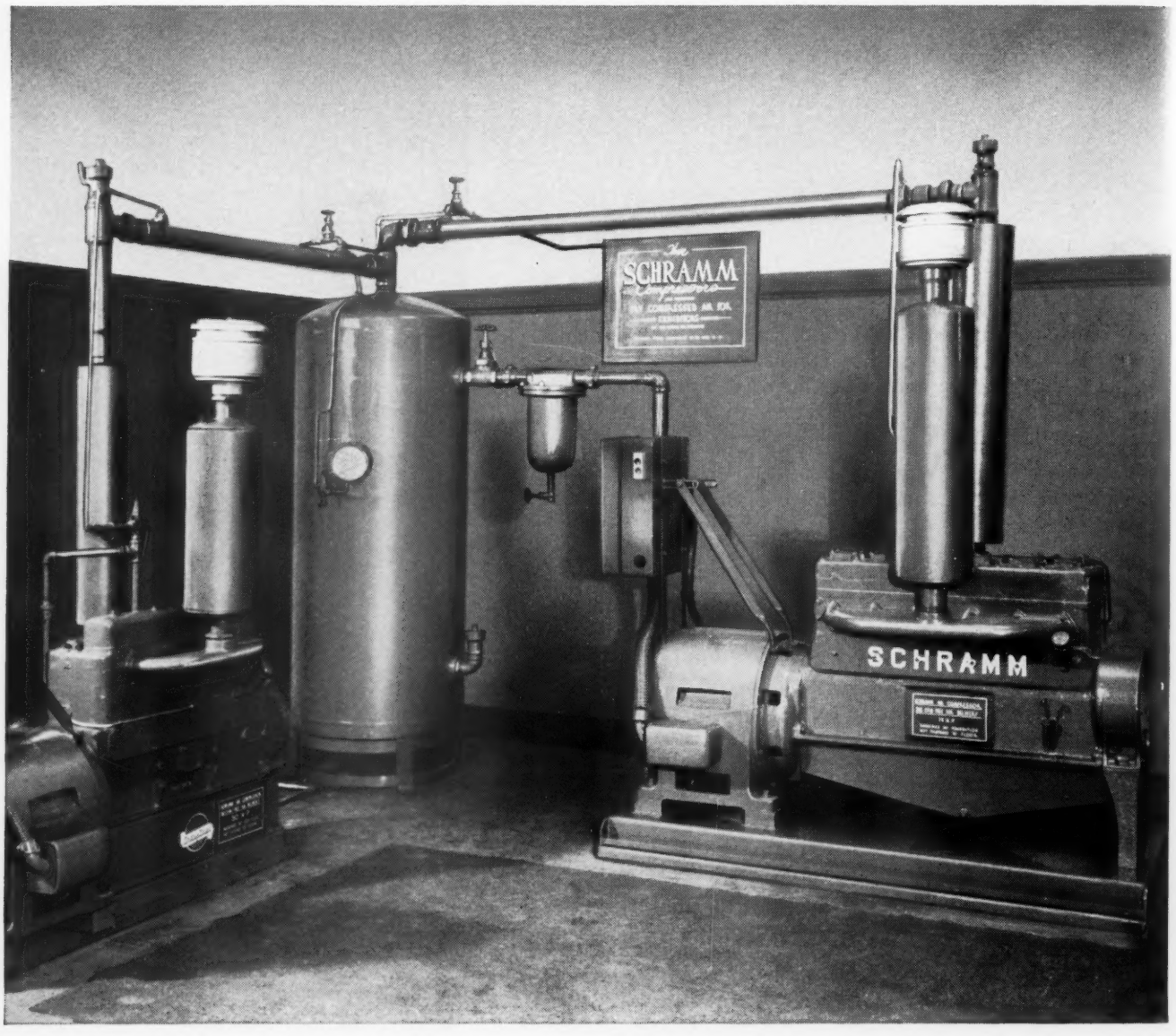
CINCINNATI°
*Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.






# Schramm chosen again to supply compressed air at Foundry Show

## These vibration-free compressors are not even fastened to the floor!

When the Foundry Show opens in Atlantic City, May 3, two of industry's best friends will be on hand to supply dry compressed air for exhibitors.

The Schramm Air Compressors chosen for this job are two Model 315 Unistage Industrials, both with direct motor drive. Like all Schramm Unistage Compressors, these are jacketed for liquid cooling. And like all Schramm Compressors, they operate *without vibration*. These units won't even be fastened to the floor.

Actual air delivery of these piston units is 315 c.f.m. respectively—at 100 lbs. Both are completely modern in design and ruggedly constructed for tough service. Both have the Schramm patented intake valve unloaders, cam operated poppet intake valves and larger valve areas, which develop volumetric efficiencies usually attributed to two staging. On every job, you can rely on them to deliver more air at controlled temperature—and at lower operating cost, year in, year out.

Be sure to see these smooth-operating units at work. You'll find them in Booths 1347-49 from May 3 through May 9. Friends of yours will also be on hand to answer any questions you may want to ask about Schramm Air Compressors.

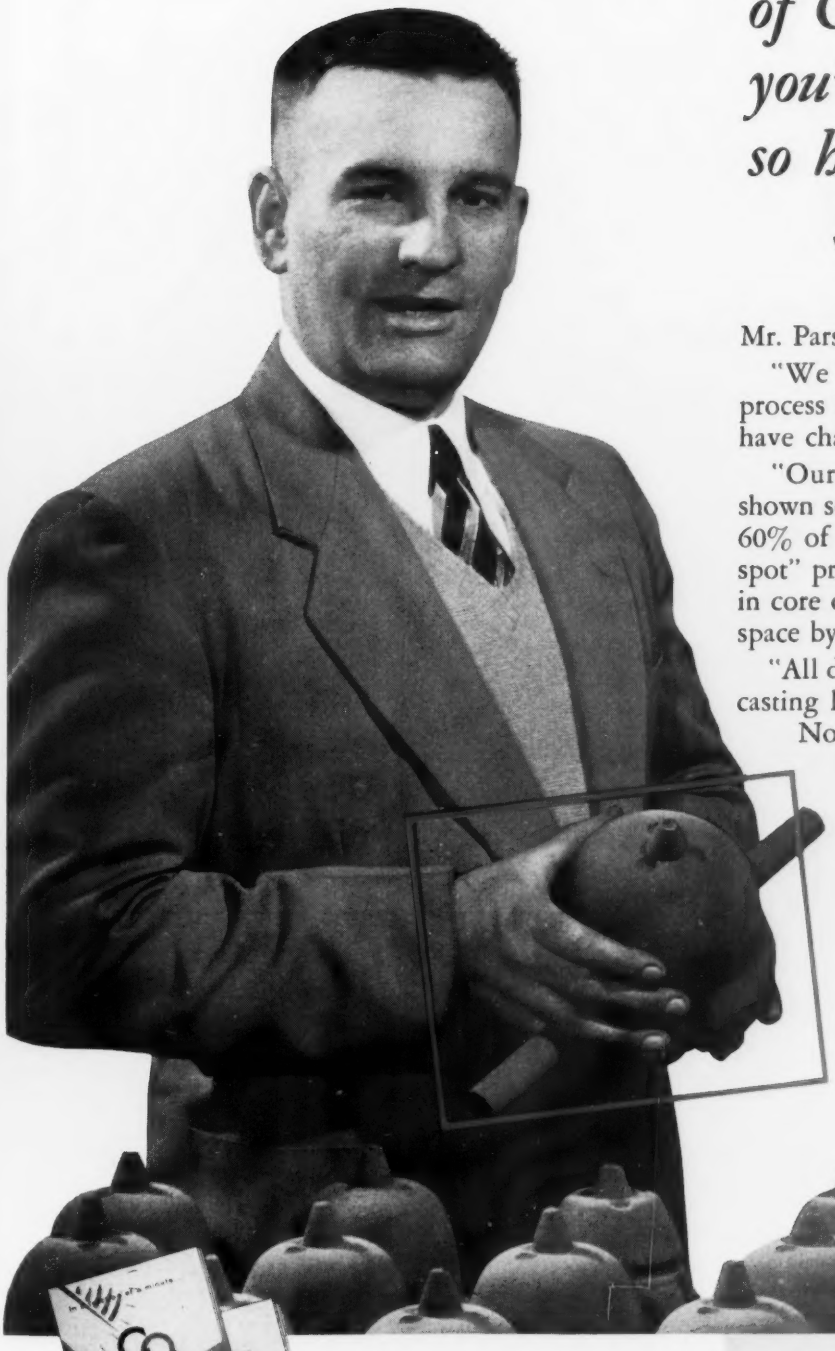
**Schramm, Inc.**

MANUFACTURERS OF AIR COMPRESSORS

**650 North Garfield Ave. West Chester, Pa.**

# *"You count 'em—the many advantages of $CO_2$ core curing and you'll see why we're so highly sold on it."*

R. J. Parsons, Foundry Superintendent
**WORTHINGTON-GAMMON METER DIVISION**
**WORTHINGTON CORPORATION**
Newark, New Jersey



Mr. Parsons goes on to say,

"We first looked into the $CO_2$ core curing process in June of last year. Since that time we have changed our entire production over to it.

"Our experience with $CO_2$ core curing has shown some amazing features. We've eliminated 60% of previous core handling due to "on the spot" production. We've shown a 10% increase in core output, yet have reduced our core room space by two-thirds.

"All dryers have been discarded. Losses due to casting leakers have been substantially reduced. Not one "blow" has been experienced with $CO_2$ hardened cores. Need for dipping has also been eliminated."

**You count the advantages.** And if you'd like full particulars on how $CO_2$ curing can revolutionize *your* core making operation, just mail the coupon.

**FREE LITERATURE**
Illustrated folder and technical bulletin give full details on $CO_2$ core curing. Mail the coupon for your copies.

*World's Largest Producer of* $CO_2$

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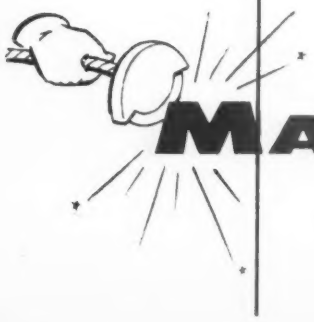
# FOUNDRYMAN

## wheel life and PERFORMANCE count!

Ever ask the foreman of your cleaning room about the *actual* cost of a grinding wheel? He'll tell you a wheel's *actual* cost is determined by the number of castings ground over the wheel... the accuracy and finish left on the work . . . and the dressing time needed to keep the wheel operating at its best.

Judged on this basis, Macklin wheels cost less in the long run. Less because they give longer wheel life, remove more metal, provide consistent wheel performance, and require less dressing.

Call your nearest Macklin distributor or sales office. A trial will convince you.



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*manufacturers of:* GRINDING WHEELS AND OTHER ABRASIVE PRODUCTS

# can you use these *Facilities?*

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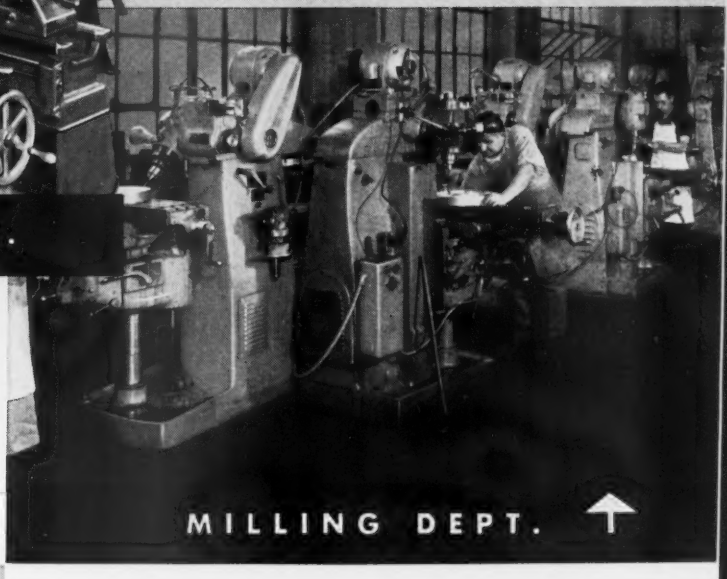


MILLING DEPT.

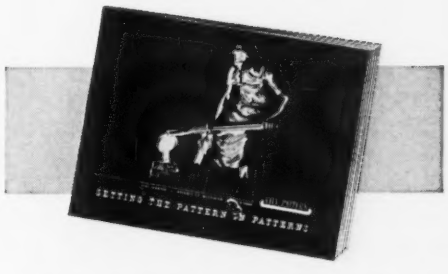
## ...they're ready and able to serve you.

**If you are looking for a reliable source for lathe work, milling and shaper work or non-ferrous castings (finish-machined or not) the chances are that City Pattern Foundry & Machine Company can fill the bill for you.**

**Each of these machining departments have a wide variety of modern equipment to handle almost any type of work that you might need. You'll find City Pattern Foundry and Machine Company an interested and economical source for both short and long runs.**

**In the foundry department you will find one of the most versatile and modern layouts in this part of the country. And, every conceivable laboratory control and testing device is on hand to insure chemical and physical specifications.**

**We will welcome the opportunity to give you more detailed information . . . won't you drop us a line or call in your specific requirements?**



### OUR NEW BROCHURE

Our colorful new brochure details our complete facilities for pattern work, foundry work and precision machining. Each department is completely illustrated with over forty recent illustrations. Your request will bring one to you promptly and without charge.

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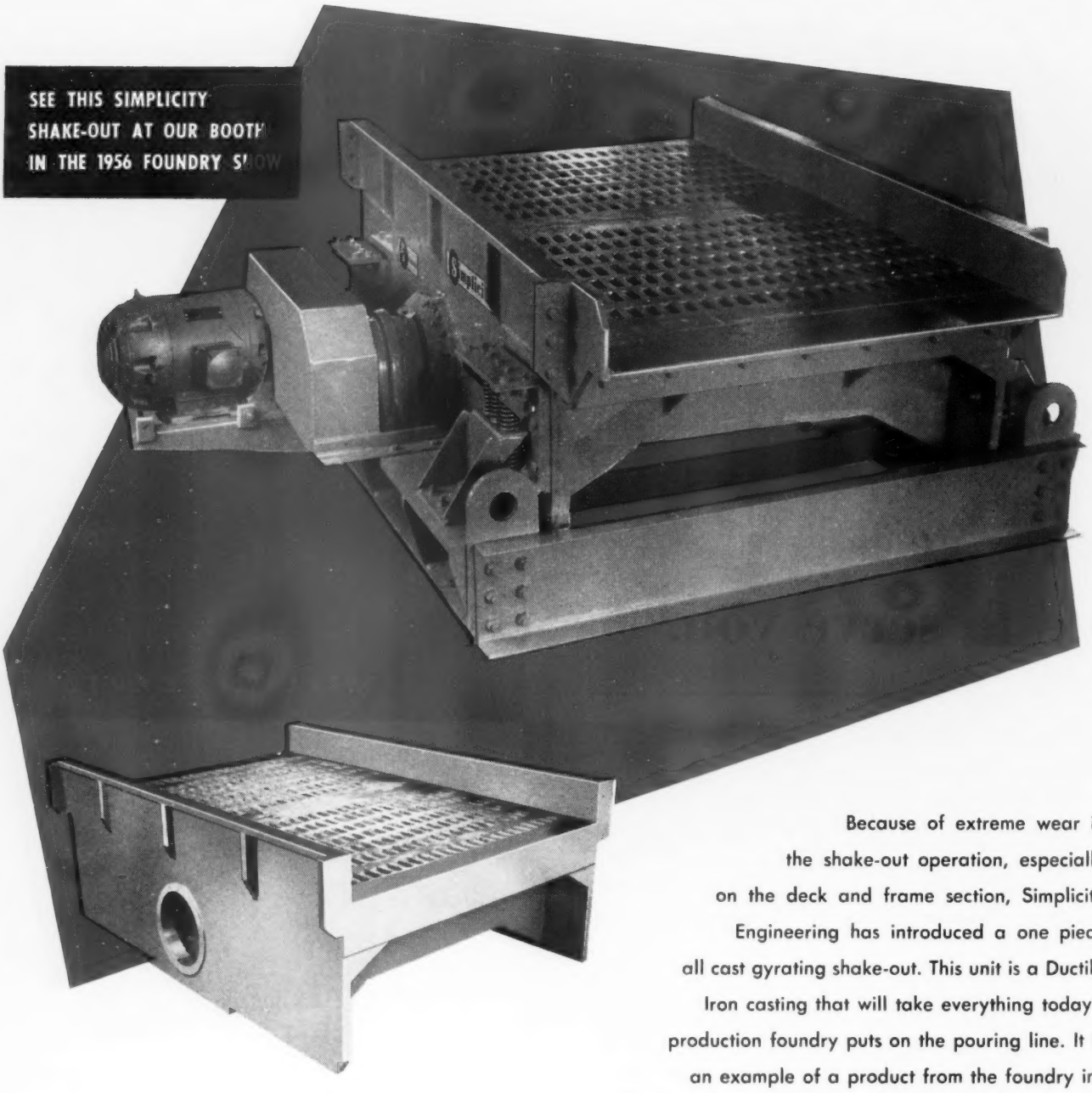
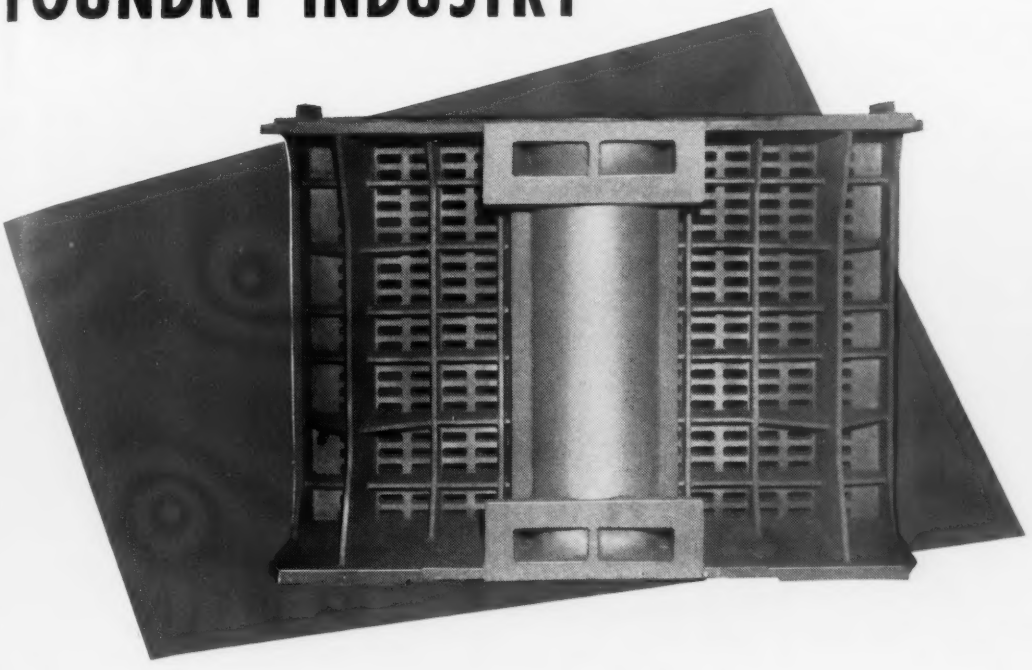
# ONE PIECE SIMPLICITY CAST GYRATING AND LOWER MAINTENANCE FOR THE




Because of extreme wear in the shake-out operation, especially on the deck and frame section, Simplicity Engineering has introduced a one piece all cast gyrating shake-out. This unit is a Ductile Iron casting that will take everything today's production foundry puts on the pouring line. It is an example of a product from the foundry industry, for the foundry industry. Cast by The Beloit Foundry Company, Beloit, Wisconsin, it has no rivets or welds, nothing to shear or work apart. Maintenance and wear are at an absolute minimum and this casting makes the all cast shake-out the quietest operating unit in the foundry industry today. This casting, as well as many other cast parts, in all Simplicity shake-outs, makes long life a built-in feature of this equipment. You'll find high performance in any shake-out manufactured by Simplicity, for over 30 years the standard in foundry equipment.

This 4' x 6' all cast shake-out is in operation at a large automotive foundry. The unit is handling 240 head castings per hour at temperatures just below molten. You'll find this punishing schedule an everyday job for thousands of Simplicity shake-outs throughout the foundry Industry.

# SHAKE-OUTS MEAN LONGER WEAR FOUNDRY INDUSTRY

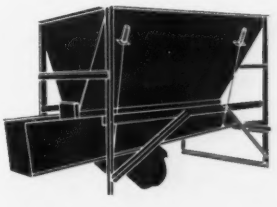


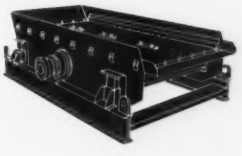
## under side view cast shake-out

A view of the under side of the all cast shake-out showing the reinforcing ribs that give this unit extra strength for long, tough operation. Simplicity also recently introduced the use of a one piece cast steel grid, replacing perforated plates on heavy duty fabricated shake-outs. This is another casting application for use in the foundry industry.

## Simplicity equipment that speeds production

In addition to Shake-Outs, Simplicity also supplies the foundry industry with many other widely-used types of equipment, including screens, feeders, conveyors, lump crushers, and sand conditioning units ● Simplicity Sand Screens help produce better castings by eliminating particles of coke, rock, shot, and other such impurities from your molding sand ● Simplicity Gyrating Screens also help to open up, fluff, and aerate the sand, and to improve grain distribution ● Simplicity Os-A-Veyor Feeders are ideal for delivering a controlled flow of material, either on a continuous basis, or in predetermined amounts ● Bin-hung Os-A-Veyor Feeders will measure coke occurately into charge buckets for the cupola, and other bin-hung or main-frame-supported units are extensively used for conveying sand and limestone ● Also available are single, double, and heavy-duty pan conveyors for sand, and grid-deck conveyors for castings ● Simplicity Lump Crushing units and Sand Conditioning equipment are valuable additions to any foundry . . . assuring the proper sand permeability which is so important to good molding ● All Simplicity equipment is designed for hard wear and long service. Send for our catalog or for any specific information you may need.





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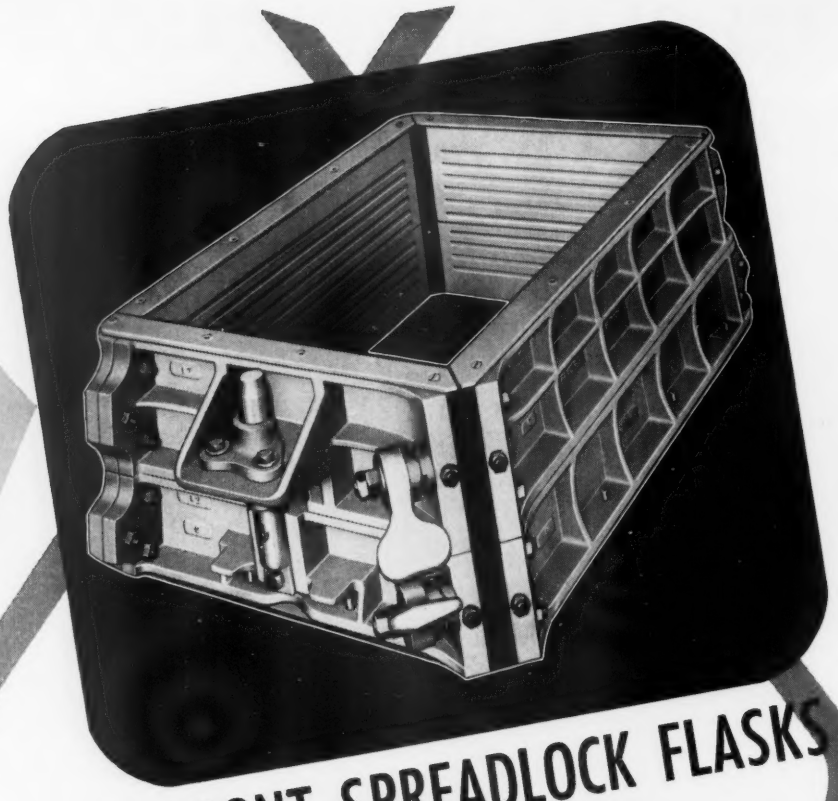
## SAND-FREE CORNERS

Corner gaps completely closed by long-life, replaceable live rubber inserts.



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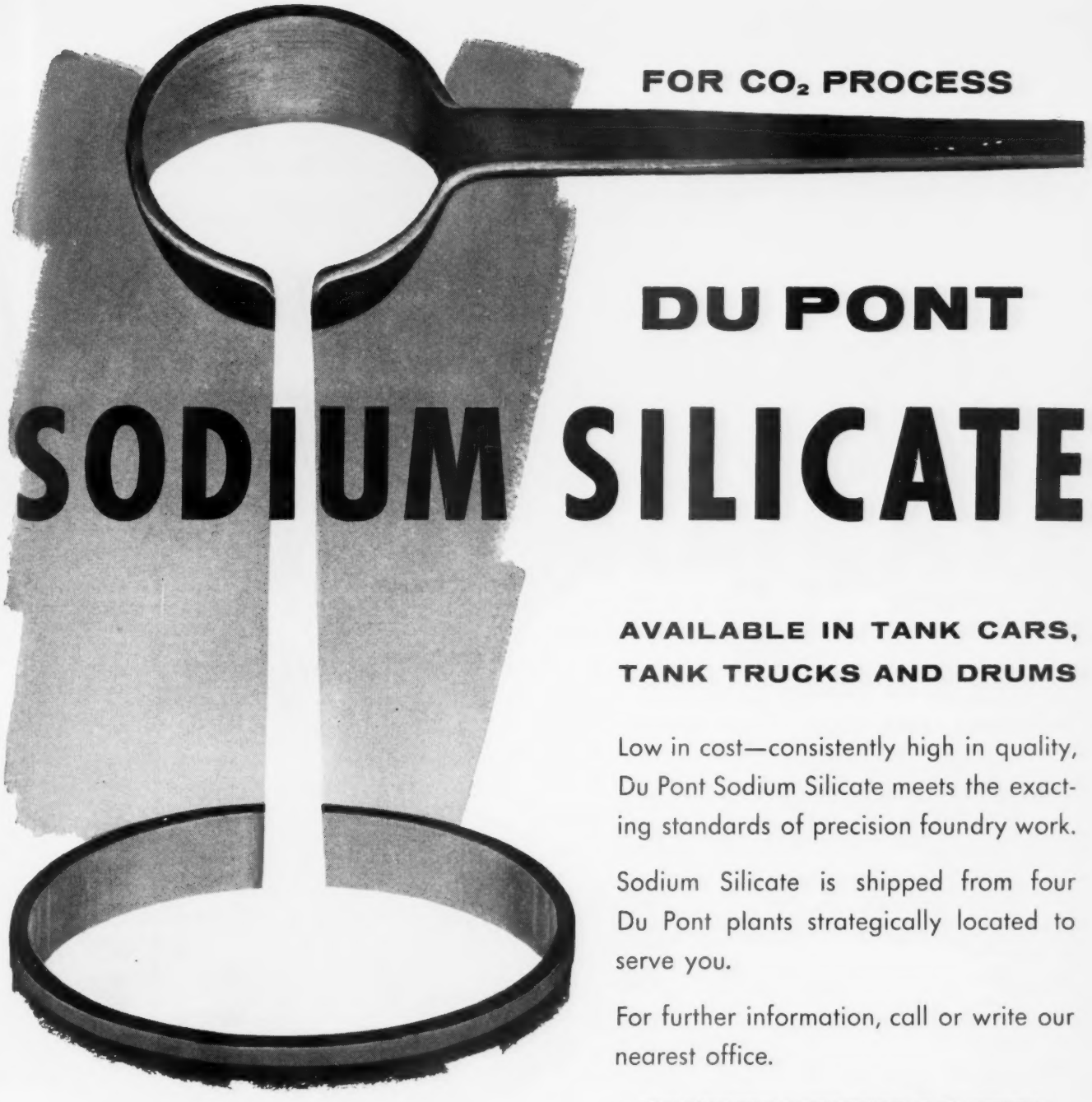

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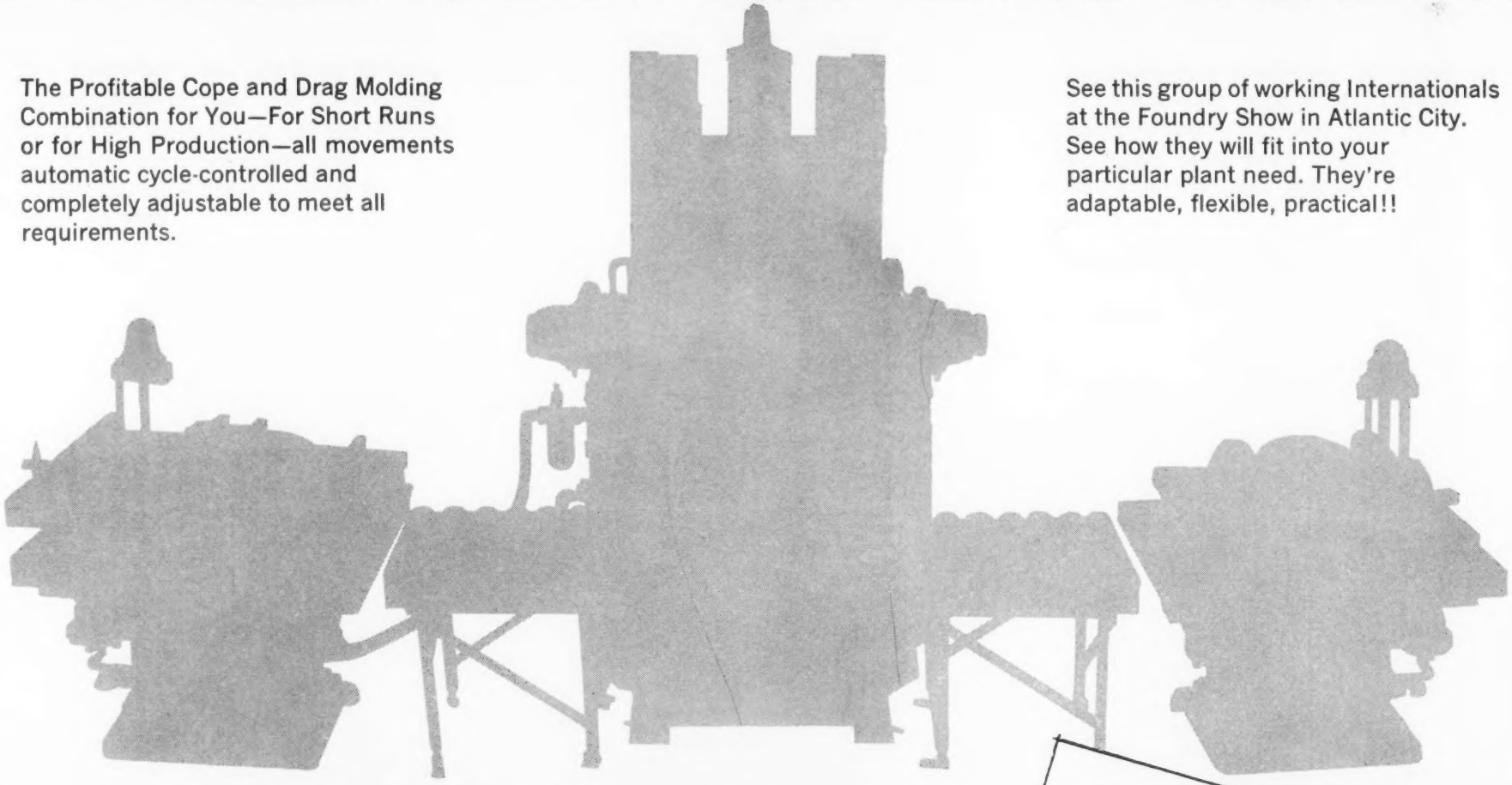
See this group of working Internationals at the Foundry Show in Atlantic City. See how they will fit into your particular plant need. They're adaptable, flexible, practical!!



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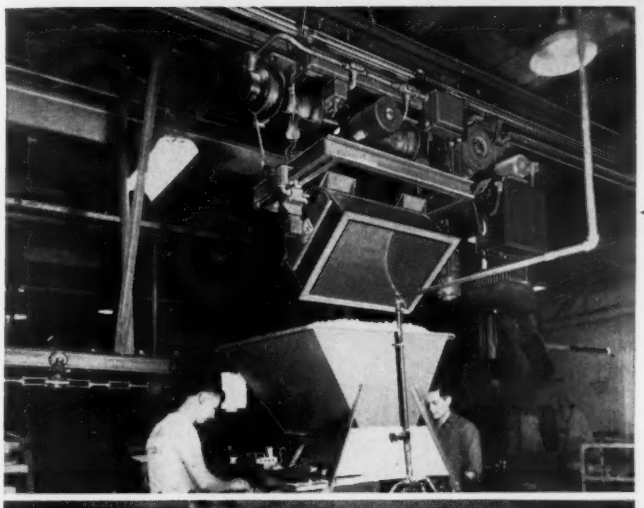

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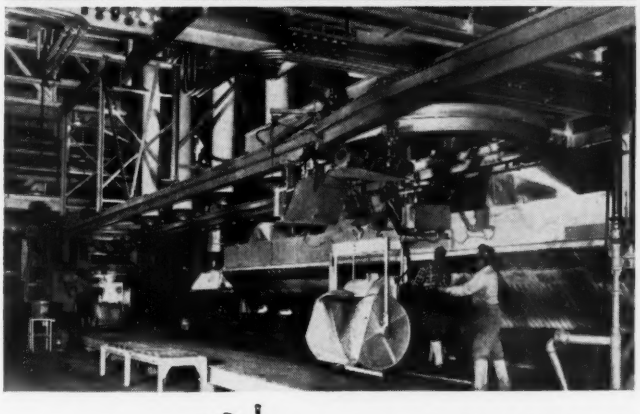
Any size or shape of load, within the capacity of a MonoRail system, can be moved by using slings, grabs or other quickly changed "below the hook" devices for hand or electric operation.



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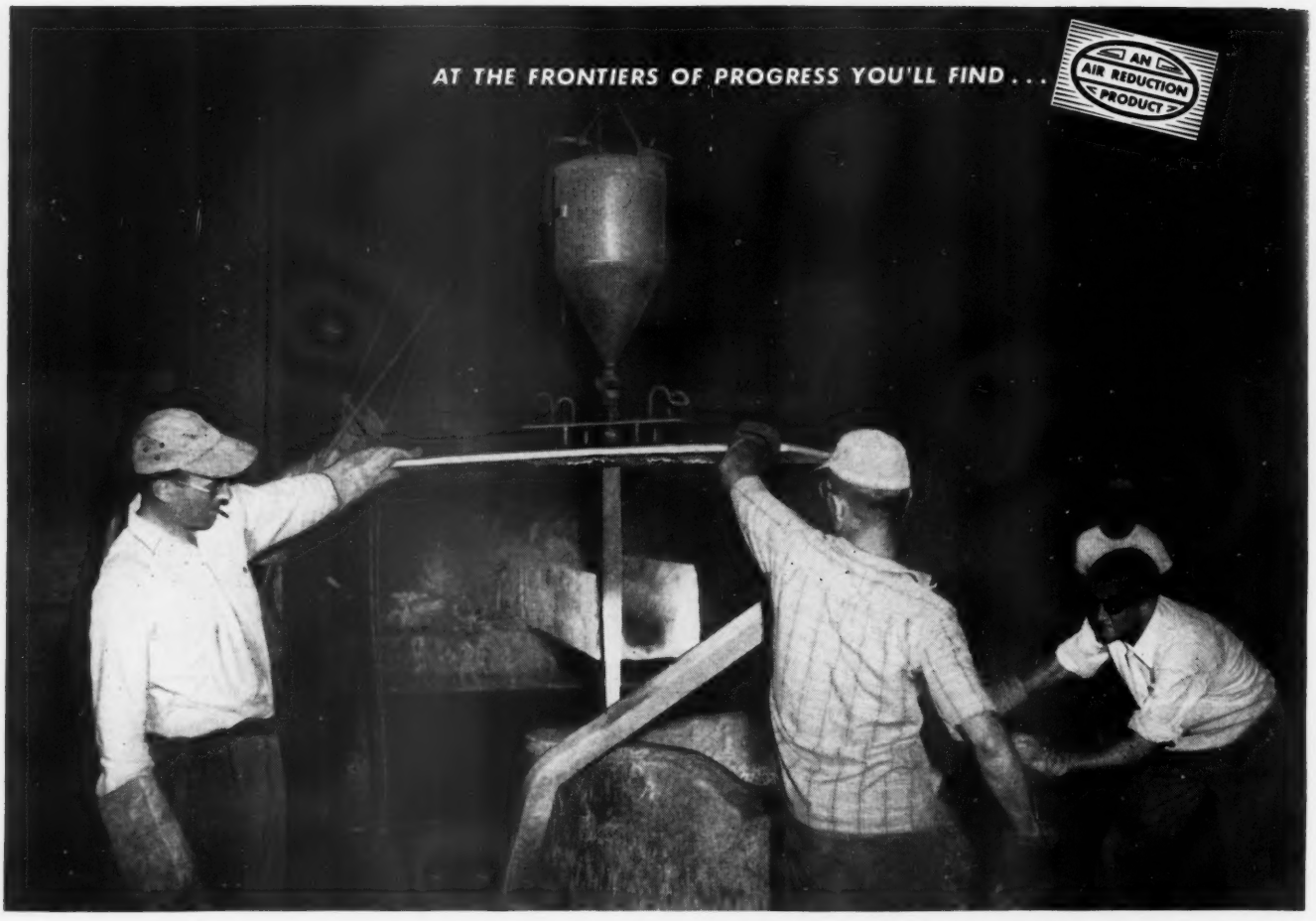


Lowering of Airco batch feeder into ladle for injection of calcium carbide.

# Now! Gray-Iron foundries can reduce cost of producing ductile iron

## INEXPENSIVE AIRCO CARBIDE INJECTION PROCESS CAN SAVE UP TO 50% BY REDUCING NEED FOR EXPENSIVE ALLOYS

**Calcium carbide,** dry nitrogen and a simple, inexpensive batch feeder are all that gray iron foundries need to reduce production costs of ductile iron, thanks to a new process developed by Airco.

**When finely ground Airco No. 20 Special Carbide** is injected with nitrogen into molten iron, the desulphurization is so uniform and efficient that ductile iron can be produced from acid cupola iron after carbide treatment. The low sulphur content of carbide treated irons—as low as 0.01% means the quantity of expensive alloys may be reduced with no sacrifice of mechanical qualities. Users of the new process have reported substantial savings by substituting less expensive alloys. Another feature of the process is its flexibility, since by using carbide treatment the same cupola charge may be used for producing a variety of grades of iron.

**The new calcium carbide injection process** is the result of Airco Technical Service's continuing effort to find new, profitable techniques for customers. If you have a cutting, welding or metallurgical problem, why not ask Airco to help you? Write to your nearest Airco office.

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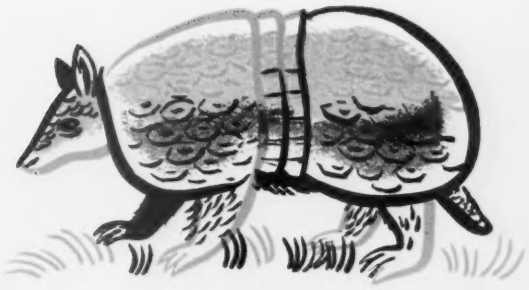
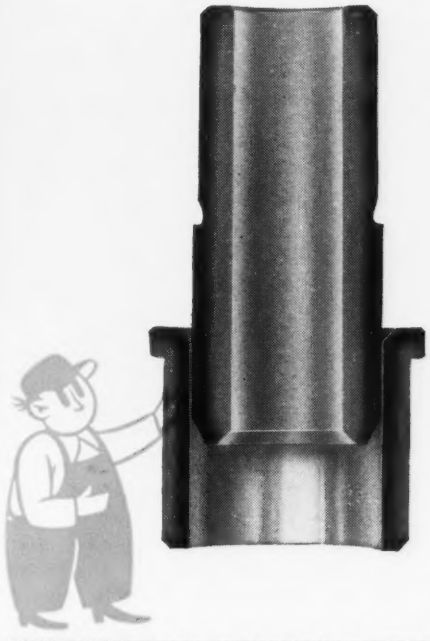
Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl-acetates, -alcohols, and other synthetic resins.

## designed like an ARMADILLO

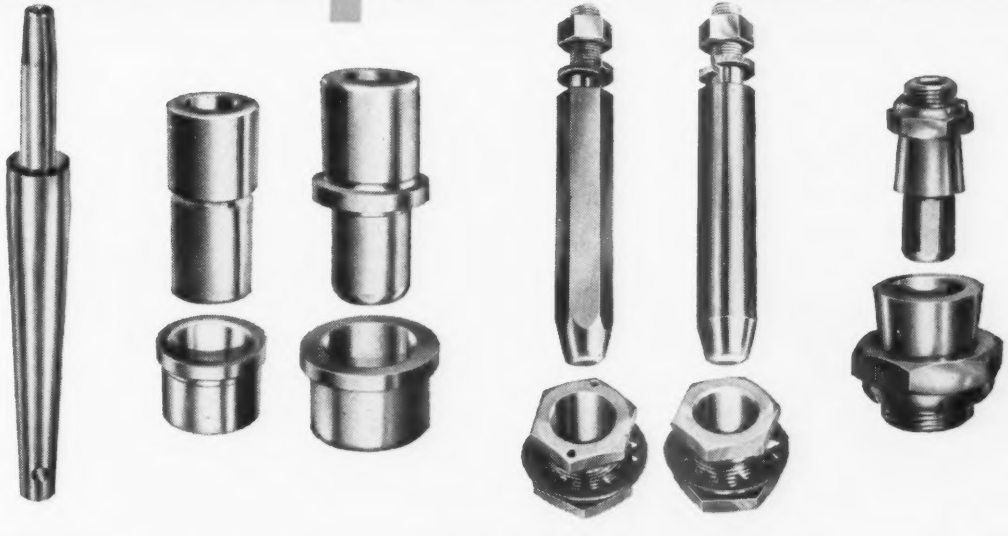
## hardened wearing surfaces and ductile cores increase life of UNIVERSAL flask pins and bushings





Universal flask pins and bushings are double quenched and double drawn to produce strong, ductile cores with a fine grain structure to enable them to withstand considerable stress, strain and rough treatment in the foundry without breaking or chipping. The wearing surfaces of both pins and bushings are carburized and hardened to improve their wearing qualities and prolong their life. Universal flask pins and bushings are precision ground to extremely close tolerances to help assure instant, accurate alignment of cope and drag. Plain or taper, round or hexagonal and threaded or plain types are available in a complete range of sizes. For complete information, write to the office nearest you — Universal Engineering Sales Co., 1060 Broad St., Newark 2, N. J.; 5035 Sixth Avenue, Kenosha, Wis. — or the home office.

175



**UNIVERSAL ENGINEERING COMPANY** FRANKENMUTH 4, MICHIGAN



*For more information, use Reader Service Card, page 347*

Welcome!
TO OUR SUITE
AT THE
TRAYMORE
HOTEL
AFS 60th CONGRESS
AND SHOW
ALLOYS
&
CHEMICALS
MFG. CO.
INC.

PRODUCERS
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ALLOYS &
CHEMICALS
MANUFACTURING CO., INC.
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# Readers' Comment

## Doing an Outstanding Job

TO THE EDITORS:

I can't resist writing to compliment you people on the appearance of your February 1956 issue. FOUNDRY is always attractive, but I believe that this issue is exceptionally so. Something else occurred to me too, as I carefully checked over the magazine, and that is what seems to me to be an unusually high quality in the advertising. More than a few of these ads are really outstanding, and a lot of thought obviously has gone into them.

I certainly don't consider myself to be any authority, but I would like to say, for whatever it is worth, that I think you fellows are doing an outstanding publishing job.

H. E. HELLING
Manager
Advertising and Public Relations
*Mathews Conveyer Co.*
*Ellwood City, Pa.*

* * *

## We Hope It's Good Weather

TO THE EDITORS:

FEMA will be in Booth 1104 at the AFS Exhibit in Atlantic City and will be glad to welcome all of the friends of the association. Public telephone and free stenographic service will be available for all equipment manufacturers either to send orders or to make weather reports.

C. R. HELLER
Executive Secretary
*Foundry Equipment Manufacturers' Association*
*One Thomas Circle*
*Washington* 5

* * *

## Castings vs Forgings

TO THE EDITORS:

I found your article, "The Automotive Gas Turbine—A Challenge to Foundries," which appeared in the January issue one of the most informative ones I have seen on this subject. It contained much information of specific value to us, which we were unable to get prior to this. Reference is made to the weight, size, rpm and temperature data, and to the illustrations and material identifications.

This article is representative of the type that I enjoy reading and I will look forward for other feature articles in your publication.

I have had the opportunity to discuss aluminum applications to automotive turbines with one of the manufacturers this week, and he is in complete agreement with your statements, namely, that he prefers castings, because be believes they could be supplied cast to size, thereby eliminating costly machining. However, none of the suppliers he contacted would consider casting these parts to the required tolerances, nor did they offer to depart from their present foundry practice and mold design in order to meet the new accuracy requirements.

Since machining would be necessary on the cast parts, the manufacturers will, without doubt, specify forgings, and take advantage of the more uniform and higher mechanical properties offered by wrought materials, particularly in view of the fact that the stresses at the design loads are close to the maximum yield strength of the cast alloys being considered.

LEO F. SWOBODA
Product Development Engineer
*Kaiser Aluminum & Chemical Sales Inc.*
*Chicago*

* * *

## French Sand For Statuary

TO THE EDITORS:

The question raised on page 110 of the January issue of FOUNDRY regarding the use of French sand for statuary suggested to me that possibly others might be interested in a little more detail.

In the first place, there is a sand available through Whitehead Bros. Co., 324 West 23rd St., New York 11, known as Yankee Sand, that gives as satisfactory results as French Sand. The following figures compare these two sands:

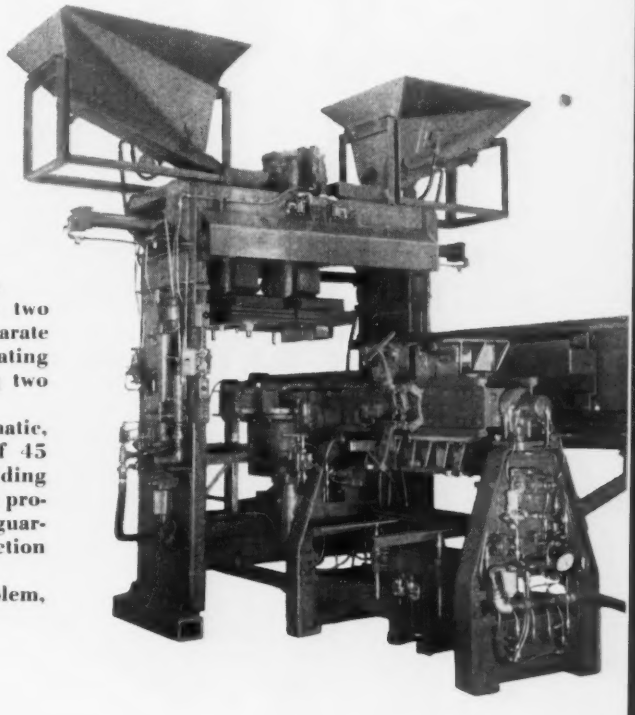
| Screen Analysis | French Sand | Yankee Sand |
|---|---|---|
| No. 6 | none | none |
| 12 | none | none |
| 20 | none | 0.4% |
| 30 | none | 0.4 |
| 40 | 0.2% | 0.8 |
| 50 | 0.8 | 1.0 |
| 70 | 2.6 | 1.4 |
| 100 | 4.8 | 3.0 |
| 140 | 7.0 | 5.6 |
| 200 | 22.8 | 26.4 |
| 270 | 31.8 | 21.8 |
| Pan | 12.8 | 19.4 |
| AFS clay | 17.2 | 19.8 |
| AFS fineness | 176 | 184 |
| Permeability | 13.8 with 5.8 moisture | 18.4 with 6.5 moisture |
| Green shear | 3.1 | 3.8 |
| Green compression | 10.5 | 16.7 |
| Dry compression | ..... | 73.2 |

To get the best results from either sand, the same procedure should be followed. First, the moisture of the sand as used for molding should be within 0.25 per cent either way of 6 per cent. All molds should be made in metal flasks and dried in an oven. The objective in molding should be to produce a casting that needs only to be brushed clean, requiring no "chasing." This means a pattern that is very carefully made, especially


For more information, use Reader Service Card, page 347

# DEMMLER

*The Oldest Name in Core Blowers*



**the DEMMLER 3T . . .**

**Owning a DEMMLER 3T is like owning *two* core blowers at the same time. 3T is fast and efficient *—has actually increased production over 100% in some foundries* —and it plays a specialized role in the giant farm machinery industry.**

**This versatile machine blows its two core boxes separately. It has two separate magazines and two automatic vibrating sand feeders, which permit running two different sand mixtures at one time.**

**The DEMMLER 3T—a fully automatic, one-man operation—is the result of 45 years engineering experience in building core blowers which today lead in high production. Low maintenance cost is a guaranteed product of Demmler construction and design.**

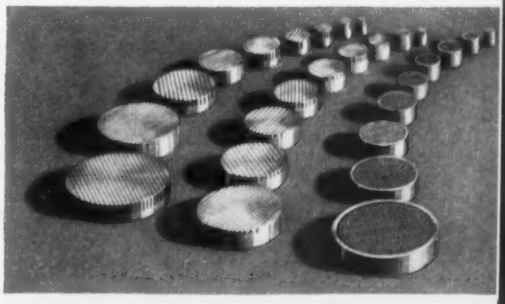
**When yours is a core blowing problem, call in a Demmler engineer.**

**PRECISION CORE BOX VENTS**

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

**NEW *HL*** ***150 Mesh Vents***

A new general purpose vent which practically eliminates the cleaning courser screens demand. Write for literature on Demmler vents.



**WM. DEMMLER & BROS.**

**KEWANEE, ILLINOIS**

# SAFE HOISTING

## THAT PAYS OFF IN SAVINGS

Safety comes first wherever foundrymen handle fragile and hazardous loads. The Series "600" 'Load Lifter' Electric Hoist assures all-around protection. It has *two* powerful brakes that act simultaneously, yet one alone can hold the full load. Starts and stops are fast — loads can be "inched" accurately at the push of a button. Cores can be set, patterns drawn, ladles tipped, molds parted and flasks stripped with complete ease and safety.

The Series "600" 'Load Lifter' also provides: non-fracturing load hook, tough wire rope, steel suspension, upper limit stop, enclosed operating parts, and safe 24 volts at the push buttons. Here is quality you can always count on! So — begin now to cut costs through safe, economical hoisting. The Series "600" 'Load Lifter' is built in ½ and 1-ton sizes. Choice of suspension, including motorized trolley. Learn all about this rugged electric hoist from *your "Shaw-Box" Distributor — or write us for Bulletin 408.*

'Load Lifter'® ELECTRIC HOISTS

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

**MANNING, MAXWELL & MOORE, INC.**

MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

in regard to the avoidance of any undercutting.

The pattern must draw from the mold with complete freedom. The temperature of casting should be as low as possible, consistent with the filling of all the finely artistic areas of the mold. Silicon bronze composed of Si 3.0 per cent, Fe 1.25, Zn 2.00, Mn and P 0.05 each, with Pb, Al, Ni and Sn nil, remainder Cu, gives excellent results. A temperature of 1900° F is likely to be correct. A tin bronze composed of Sn 3 per cent, Zn 7 and the remainder Cu, also is good for decorative plates and tablets. For statuary, reverse the percentages of tin and zinc.

The mold should be rammed much harder than an ordinary mold, in which case bars for reinforcing purposes are unlikely to be required. Take particular care to ram the sand closely into the finest crevices of the pattern. The result will be a mold which, even in the green state, is very strong and which after baking at 425° F will require a hammer to break it. This kind of sand when new shrinks considerably, and it frequently is better to use a mixture of half new and half used sand.

If the pattern is plaster with considerable modeling, it should be lifted out of the drag and "faced back." This means spraying with molasses water and then dusting with very fine charcoal powder or plumbago, followed by another dusting with lycopodium. After this dusting operation, the mold should not be touched at all by tools or brushes.

After the box is dried and closed, the cope and drag must be very securely fastened to avoid any movement due to the lifting force of the molten metal.

If there is any question of the metal's being gassy, precautions should be taken to degas it by passing dry nitrogen through it, by the 'Gazal' process, in which the metal is degassed in a ladle with a porous plug at the bottom through which the fine, almost atomized gas passes through the molten metal. This can be done during the interval between the filling of the ladle and its being carried to the mold. This method will be found much more effective than merely passing in nitrogen through a metal tube, even if the tube has perforations.

It goes without saying that all dross must be kept out of the mold. Where the casting is large enough, a pouring box should be used that is large enough to hold all the metal needed and is fitted with a plug that can be drawn when all is in readiness.

HAROLD J. ROAST

140 *Grosvenor Ave.*
*Ottawa* 1, *Ont.*
*Canada*

## the most important 15 MINUTES at the Foundry Show

In 15 minutes you can see the "new muscles" that make Tabor Machines your one best buy. In operation at the Tabor booth:

- the improved Series "700" Multi-Stack Molding Machine. Job-proved to step-up your production.
- improved Tabor-Brasive Cut-Off Machines with changes that speed cutting time, reduce operator fatigue.

Operate the equipment yourself. Talk to the Tabor Man — the Technical Man. It won't take five minutes to learn that here's a man who talks your language — production runs, schedules, mechanization, automation. Step up to the Tabor booth and you'll step up to profit.

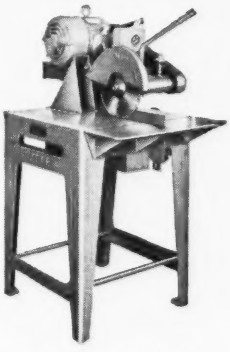
**THE TABOR MANUFACTURING CO.**
**LANSDALE, PA.**
***Division of Turbo Machine Company***

*New Condensed Catalog is yours for the asking*

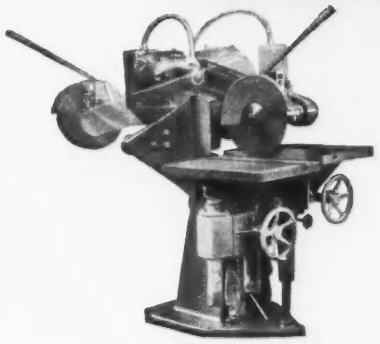
TM TM

**THE TABOR MAN IS A TECHNICAL MAN**

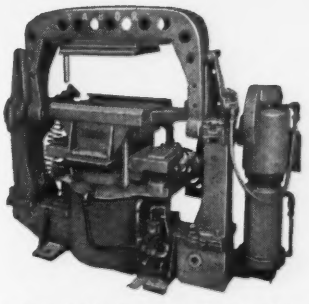
# TABOR



Tabor 5 HP Cut-off



Tabor 10 HP Cut-off



Tabor Multi-Stack Molding Machine

# Cutting 4 risers per minute...

Lightweight and easy to handle, this OXWELD powder-cutting blowpipe makes fast work of risers.

## *Powder-Cutting speeds removal operations 300%*

Removing risers from stainless steel castings need no longer be costly and time consuming. Pictured above is a typical powder-cutting operation at the Ohio Steel Foundry Company, Springfield, Ohio. Here, 2 by 4 inch thick stainless steel risers are removed by powder-cutting in only 15 seconds. By methods previously used, this operation took up to four times longer.

**In the powder-cutting process** metal powder is automatically injected into an oxygen flame to increase the flame's heat and severing action speed. The powder process is helping users gain new efficiency and speed in the removal of gates and risers, sand incrustations, and casting defects.

**The powder-cutting blowpipe** used in this operation, an OXWELD AC-4, is designed for hand cutting of oxidation resistant metals such as stainless steel, chrome alloys, and cast iron. Heavier apparatus is also available for manual and mechanized operations.

Increase your production and profit—call your local LINDE representative, or write for illustrated literature on LINDE's modern processes. Start saving now, do it today.

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**A Division of Union Carbide and Carbon Corporation**
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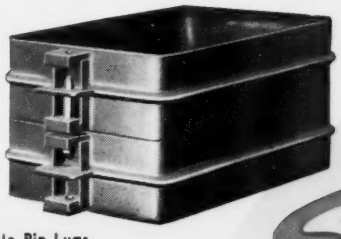
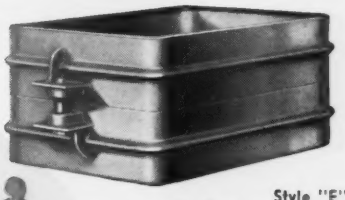
# See STERLING at Atlantic City

STOP AT STERLING Booth 1911

**Come to the 60th AFS Castings Congress and Show May 3 to 9 at Atlantic City. A warm welcome awaits you in this hospitable and interesting convention city. You will be delighted with the variety and quality of the AFS exhibits where you will see and learn about the very latest in foundry progress. You will find the Sterling booth of special interest, with a complete display of the foundry flasks and equipment which have won world-wide leadership. The AFS Show . . . and STERLING . . . have much to show you this year. Come to Atlantic City in May! Meanwhile, for flasks and other foundry equipment that speed up production and save you money, see your nearby Sterling representative, or write us direct.**

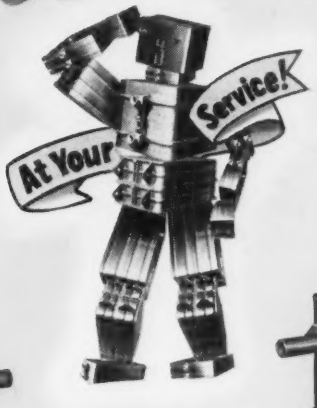


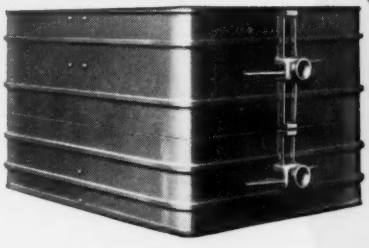
Style "AD" with Double Pin Lugs



Style "E"
with Pin Lugs and Handles Combined

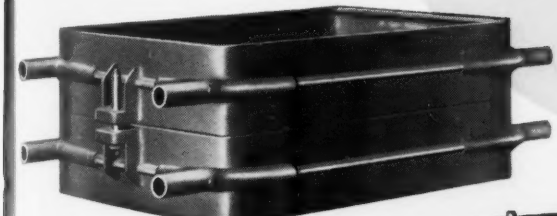
Sterling



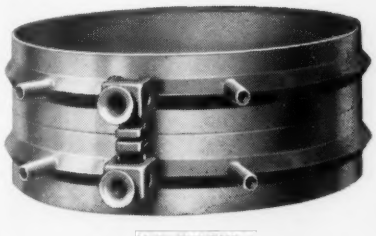
Style "⅜ND-RT Cope"
Style "⅜NS-RT Drag" } Heavy Duty Flask

Style "H" with Pin Lugs Welded on Sides



Style "GSX"
with Single Pin Lugs and Two-Man Lift Handles

Style "LS"
with Angle Reinforcement and Two-Man Lift Handles



Style "BLST"
with Trunnions and Two-Man Lift Handles

Style "AD" Flask Sections Stacked One Above Another
for Multiple Molding

Style "⅜ND-RTX Cope" — Style "⅜NS-RT Drag"
with Heavy Duty Clamps

**STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.**

**Branches: Boston • Buffalo • Chicago • Cleveland • Detroit • Palo Alto • New York • Philadelphia • St. Louis**

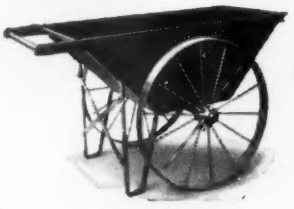
**Subsidiary Company: STERLING FOUNDRY SPECIALTIES, Ltd., London, Bedford and Jarrow-on-Tyne, England**

# STANDARDIZE on STERLING

## *for* FASTER PRODUCTION *at Less Cost*

**"Built to take it!" That best describes every unit in the Sterling line. It has made Sterling a by-word for economy and efficiency throughout the entire foundry industry. When *you* specify Sterling . . . whether for flasks, trucks, wheelbarrows or other foundry equipment . . . you can *depend* on this rugged high quality, accuracy and ease of handling . . . day in and day out, for years. For faster casting production, at less cost . . . *standardize* on Sterling! See your nearest Sterling representative or write us direct.**

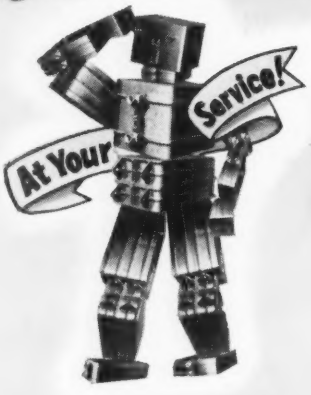
No. DF4-S Heavy Duty Wheelbarrow



No. 47 Casting Cart

No. 50 Slag Buggy

Sterling

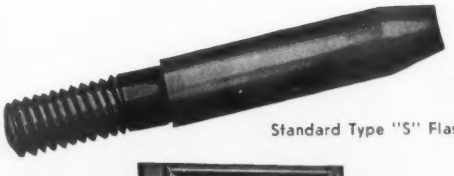


No. 110 Core Truck

No. D4W Wheelbarrow for sand and other dry materials

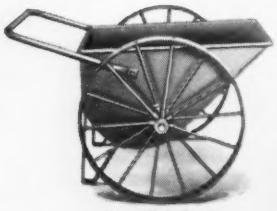
No. 160 Heavy Duty Casting Truck

Heavy Duty Cart with "3-Point Landing"

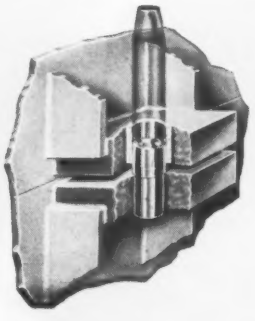


Standard Type "S" Flask Pin

Sterling Flask Clamp

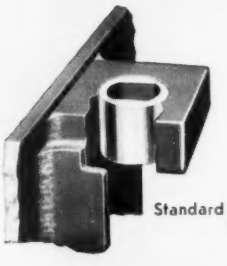


No. 630-S Cart with Steel Wheels



Stub Pin Shift-proof

Style X Core Plate



Standard Hardening Steel Bushing

**STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.**

***Branches:*** **Boston • Buffalo • Chicago • Cleveland • Detroit • Palo Alto • New York • Philadelphia • St. Louis**

Subsidiary Company: STERLING FOUNDRY SPECIALTIES, Ltd., London, Bedford and Jarrow-on-Tyne, England

# Tools for Tomorrow

The foundry industry has many tools for tomorrow's progress, as our editors show in the special section starting on the next page.

Technical developments have made possible the production of castings with physical and mechanical properties little dreamed of a few years ago. Foundry practice has been improved greatly, thus removing at least some of the many variables which formerly plagued producers of castings.

Development and improvement of the many types of foundry equipment have added much to the progress of the foundry industry. Mechanization, and in some cases automation, has brought both increased and improved production. Melting, sand preparation, coremaking and baking, molding, pouring, cleaning, finishing and other operations are controlled and performed much better because well designed equipment is used in the processes. Foundrymen also have available a wide variety of improved or newly developed supplies that add much to the successful production of castings.

Although developments in machines, materials and practices provide a solid basis for building the foundry industry of the future, the most important tools for future progress will be provided by men. Success in producing castings that meet tomorrow's demands and in building bigger markets for cast products rests with management, and management includes everyone connected with the operation of the plant, from the boss to every foreman. These are the men who must not be content with tradition or satisfied with progress of the past. Further developments in technology, practice, machines and supplies must be made and applied to meet the challenge of the future.

Because a large segment of foundry management is alert and anxious to move forward, thousands of foremen, superintendents, engineers, metallurgists, managers and presidents will be in Atlantic City May 3 to 9 to inspect the latest developments in equipment and supplies and to participate in a review of technical accomplishments. The 1956 AFS Congress and Show, described in detail in this issue, offers much to an industry which recognizes the need for moving forward with better products and lower costs.

The production of castings is a fascinating business. Once it gets into the blood, the individual finds it hard to break away. Because of this fascination, men for many years have worked and struggled, studied and searched for better ways of making castings. Their accomplishments provide the tools for tomorrow's progress.

And the work, the study, the research and the accomplishments must continue.

Frank G. Steinbach
Editor

# Tools for Tomorrow's

**Technological advances, new processes, improved equipment and supplies, more capable management—these are the principal tools which can enable foundries to share fully in the broader market for engineering materials in the years ahead**

FOUNDRIES face the task of producing more and better castings than ever before, and of doing it more efficiently than in the past. This problem is not necessarily for the immediate future alone; it will prevail five, ten and fifteen years from now.

Does the industry have the tools to handle the job? It has many of them today, as is discussed in considerable detail on following pages. Others are in the development stage, but still more must be devised if future opportunities are to be realized fully.

**Why More Castings?**—Our economy has made astounding strides since World War II. In those ten years our gross national product—expenditures for goods and services — has increased 80 per cent.

The index of industrial production, as measured by the Federal Reserve Board, rose from 90 in 1946 to 138 in 1955.

Production of electric power last year was 140 per cent higher than in 1946.

Steelmaking capacity has been enlarged 34 per cent since the war.

Construction work of all types has boomed. In fact, the approximately $35 billion worth of industrial construction planned for this year is one of the major props to the current high rate of business in general. Certainly it is one of the strongest bits of evidence that industry as a whole has faith in the soundness of our future economy.

Nobody expects an uninterrupted rise in business volume in the ensuing years. The ups and downs of the last decade were normal and undoubtedly will continue. A major break occasioned by war is always a threat.

Nevertheless, so long as a constantly growing population strives for an improved standard of living, and so long as industry continues to increase its manufacturing efficiency and develop new markets, the long-term trend of production will be upward.

**Realizing the Potential**—If foundries are to share fully in the larger market which appears in prospect, they must meet successfully the competition of other fabricating methods. This will require a product of consistently high quality, produced as economically as possible and sold at a fair profit.

It is only natural that users of castings should intensify their demands for higher quality. They require a uniformly good product of closest possible dimensional tolerances in *their* attempts to reduce manufacturing costs. And if they don't find this quality in castings, they are potential customers for forgings, weldments or stampings.

Among the tools which foundries have at their command to meet the requirements of quality and volume are these:

**Technological Progress**—Making a casting can be simple or difficult, depending on how good a product is desired. Much has been learned during the last ten years about what makes the difference between a good casting and a poor one. This knowledge embraces molding, coremaking, melting and metallurgy.

Improved metals have been developed. New molding and coremaking processes have emerged from the experimental stage. Quality control programs have been adopted more widely.

**Modernization and Mechanization** — Manufacturers of foundry equipment and supplies have made available new and improved products which permit foundries to make better castings more rapidly and with less manual effort than formerly. Foundries themselves have devised numerous ways to mechanize the handling of materials so as to improve efficiency and working conditions. These trends must continue if larger tonnages of castings are to be produced more economically.

**Management** — A strong awareness of the importance of factors other than production marks the forward-looking foundry manager.

He is cost-conscious and prices his castings intelligently. He provides adequate training for personnel and fosters good relations with his employees and the community. He strives for safe and healthful working conditions. He is a firm believer in research work pertaining to both products and markets.

His attitude and activities will be a most constructive force in permitting the foundry industry to capitalize on its future opportunities.

For additional discussion of the management and other factors, see the special articles on the following pages. These staff-written articles are based to a large extent on information supplied by members of the industry.

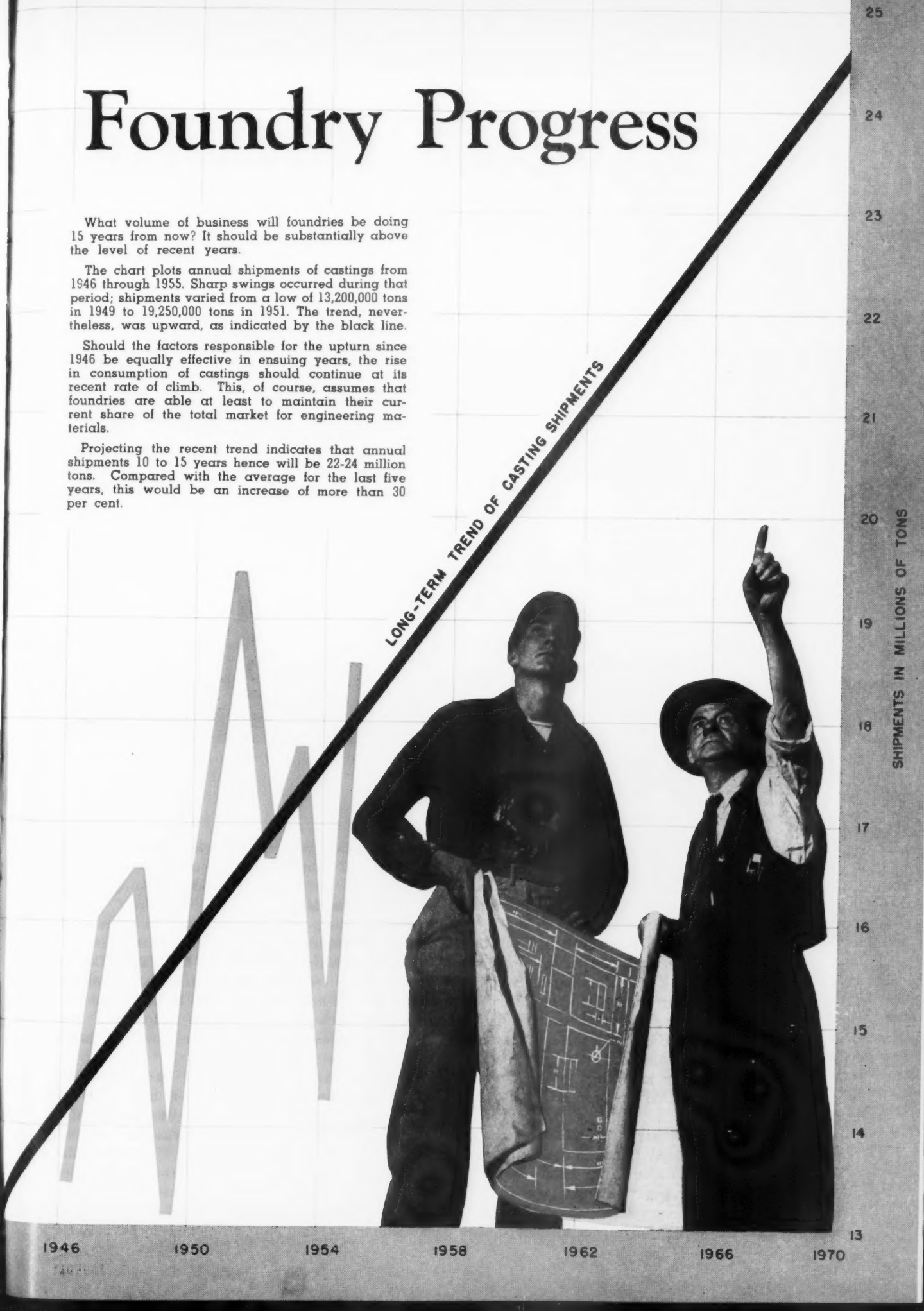
# Foundry Progress

What volume of business will foundries be doing 15 years from now? It should be substantially above the level of recent years.

The chart plots annual shipments of castings from 1946 through 1955. Sharp swings occurred during that period; shipments varied from a low of 13,200,000 tons in 1949 to 19,250,000 tons in 1951. The trend, nevertheless, was upward, as indicated by the black line.

Should the factors responsible for the upturn since 1946 be equally effective in ensuing years, the rise in consumption of castings should continue at its recent rate of climb. This, of course, assumes that foundries are able at least to maintain their current share of the total market for engineering materials.

Projecting the recent trend indicates that annual shipments 10 to 15 years hence will be 22-24 million tons. Compared with the average for the last five years, this would be an increase of more than 30 per cent.



# IMPROVED MOLDING

Allis-Chalmers

PROBABLY the most important development in green sand molding practice in recent years has been the wider adoption of previously tried and proved methods, coupled with increased application of quality control.

Helping to promote this trend has been the growing attention given to the newer molding methods which offer relatively close dimensional tolerances and good surface finish. One foundryman is supposed to have remarked that he didn't see any sense in adopting shell molding because as yet he hadn't started to make green sand castings as good as he knew how. Many foundries have been persuaded or prodded into doing the latter.

The knowledge necessary for effective use of green sand is available. Causes of the common casting defects attributable to sand have been defined. Improved equipment and materials for the preparation of satisfactory sand mixtures and control of their composition have been developed. The other important requisite—everlasting attention to the details of sand preparation and use—generally measures the difference in product quality of individual foundries.

**Shell Molding**—Today, according to some estimates, 500 foundries are engaged in shell molding. In 1955 there were 400 and in 1953, 200. Use of shell molding resin in 1956 is placed at 15 million lb; in 1958 it may be 20 million lb, and consumption may reach 50 to 60 million lb by 1961. Not all of this goes into shell molds, however; much is used in resin-bonded cores.

Rapid growth of shell molding has occurred in high-production automotive shops, but it is not all concentrated there. Many captive and jobbing foundries producing a variety of castings in gray, nodular and malleable irons, high-alloy steel, aluminum, and brass and bronze have sizable shell molding operations. Magnesium has been poured successfully in molds made with a sand-resin mix containing an inhibitor developed by the Army

# TECHNOLOGY

## . . . Can Gain Markets

**Probably no comparable period has seen as many and as important technological developments in the foundry industry as have been witnessed the last ten years.**

**These developments embrace a wide range of subjects. They include such things, of course, as shell molding and coremaking, high-pressure molding, carbon dioxide hardening of cores and molds, cold type core binders and nodular iron. Less spectacular but likewise important has been the broader knowledge gained about metal flow and solidification, design of gates and risers, fundamentals of sand behavior and ways to prevent casting defects.**

**Coupled with the advances made in equipment design and in the variety and application of both new and improved materials, this technological progress—if applied effectively—places foundries in an advantageous position in their competition with other industries.**

Ordnance Corp. Research of the Steel Founders' Society has disclosed other additives which improve, considerably, the surface smoothness of low-alloy and plain carbon steel castings poured in shells.

The size and weight of castings poured in shells is much larger than was thought possible a few years ago. Pearlitic malleable iron automotive V-8 crankshafts weighing 64 lb are being poured two-up. The molds carry a total of 284 lb of metal. Another foundry has poured a 420-lb alloy steel guide shoe used on seamless tube mills. It is 16 in. wide, 32 in. long and 9 in. high. One authority predicts that automotive shops will be pouring engine heads and blocks in a few years. Some engineers, however, believe that by that time the automotive turbine engine will be here, and many shell mold castings will be going into it.

Both coated sands and dry mixes are being used in dump box machines. Hot and cold coating with liquid resin is done in conventional mullers. Some foundries use paddle mixers. Mixing sand with dry resin usually is done in mullers. Dust suppressants are used in both mixing methods.

Coated sands ordinarily are used for blowing shells. Several manufacturers have developed mold blowers recently, but a majority of foundries continue to use the dump box method of pattern investment. That method is suitable for molds which do not require accurate backs as well as faces, as in the case of large castings. Where stack molding can be used for large numbers of small castings, blown molds may find wider application. Another use is in blown shell liners for use in permanent molds. Such liners increase permanent mold life and reduce chill effect on the casting. One foundry operator has developed a combination dump-blow method of pattern investment. Besides producing what is claimed to be a denser shell, the method eliminates the need and time for inverting the box and pattern a couple of times for each investment.

Gluing mold halves together with resin seems to be the generally accepted closing method, although a few shops use clips.

Molds are poured in various ways. Some are poured horizontally with green sand backing or no backing, depending on weight of the castings. Those poured vertically usually are backed with steel shot. Gating required for the casting usually is considered to be the determining factor. Yet in two foundries, pouring the same part, one pours horizontally, the other vertically.

Most foundries are avoiding the sand reclamation problem by using the loose shell sand in their green sand systems. Unburned lumps are moved to the dump, and some foundries throw away all used sand. A few shops have or are planning to install reclamation systems involving crushing the lumps and burning off the resin in furnaces designed for the purpose. No difficulties have been encountered with reuse of such reclaimed sand.

**High-Pressure Molding**—High-pressure molding was conceived as a means of obtaining dimensionally accurate castings from a dense, firm mold. Early tests used presses operating at 600 psi with a waterless sand. Subsequently it was found that mold density necessary for precision could be developed at 100 psi, provided the sand was sufficiently flowable and a uniform squeeze could be developed. These requirements have been met with the diaphragm principle of molding and a modification of the original waterless sand to provide the desired flowability. Chemical additives are used in preparing the sand mixture.

High-pressure molding sand requires relatively high strength to obtain maximum hardness. In addition it needs 1) high toughness combined with high flowability, 2) low moisture, even in very fine sands, 3) ability to ram hard without expansion defects, and 4) ability to modify properties, quickly and precisely. For less exacting requirements, high-pressure molding equipment also is being used with ordinary high-strength sands to impart good finish and dimensional tolerances to castings.

Still in the development stage is the combined use of high-pressure molding and hardening by $CO_2$. In this case the mold is squeezed, then treated with $CO_2$ before being stripped from the pattern. Relative thinness of the shell formed in diaphragm molding promotes rapid curing, while high density of the mold imparts maximum cured strength.

For a more detailed review of this subject see "High-Pressure Molding—Past, Present and Future" by Tom Barlow, FOUNDRY, March 1956.

**Plaster Molding**—Torque converter drives are finding increased use in automotive and industrial applications. To meet this trend, experimental and development work in casting in plaster the intricate, contoured blades for the drives is gaining momentum. Unless price becomes a prohibitive factor, increased production of blades and components should provide a boost for this casting method.

One company's plaster-molded products find a ready acceptance because they continually meet high standards of metallurgical quality, pressure tightness, dimensional accuracy which minimizes machining, intricacy of design, surface smoothness and sharpness of detail. These desirable attributes are attained in impellers, torque converters, propellers, diffusers, wave guide components, supercharger inducers, magneto housings and other castings for aircraft, microwave, automotive and special military applications.

The dimensional control obtained by this foundry with this method revolves around the great care taken in the production of a distortion-free mold. During the setting of the slurry, the molds are allowed to rehydrate without being disturbed. Gypsum crystals re-form throughout the interior of the mold mass in grains similar in size to grains of sand. Mold mass has strength in addition to high permeability. Surface remains smooth as the interior becomes granular and permeable.

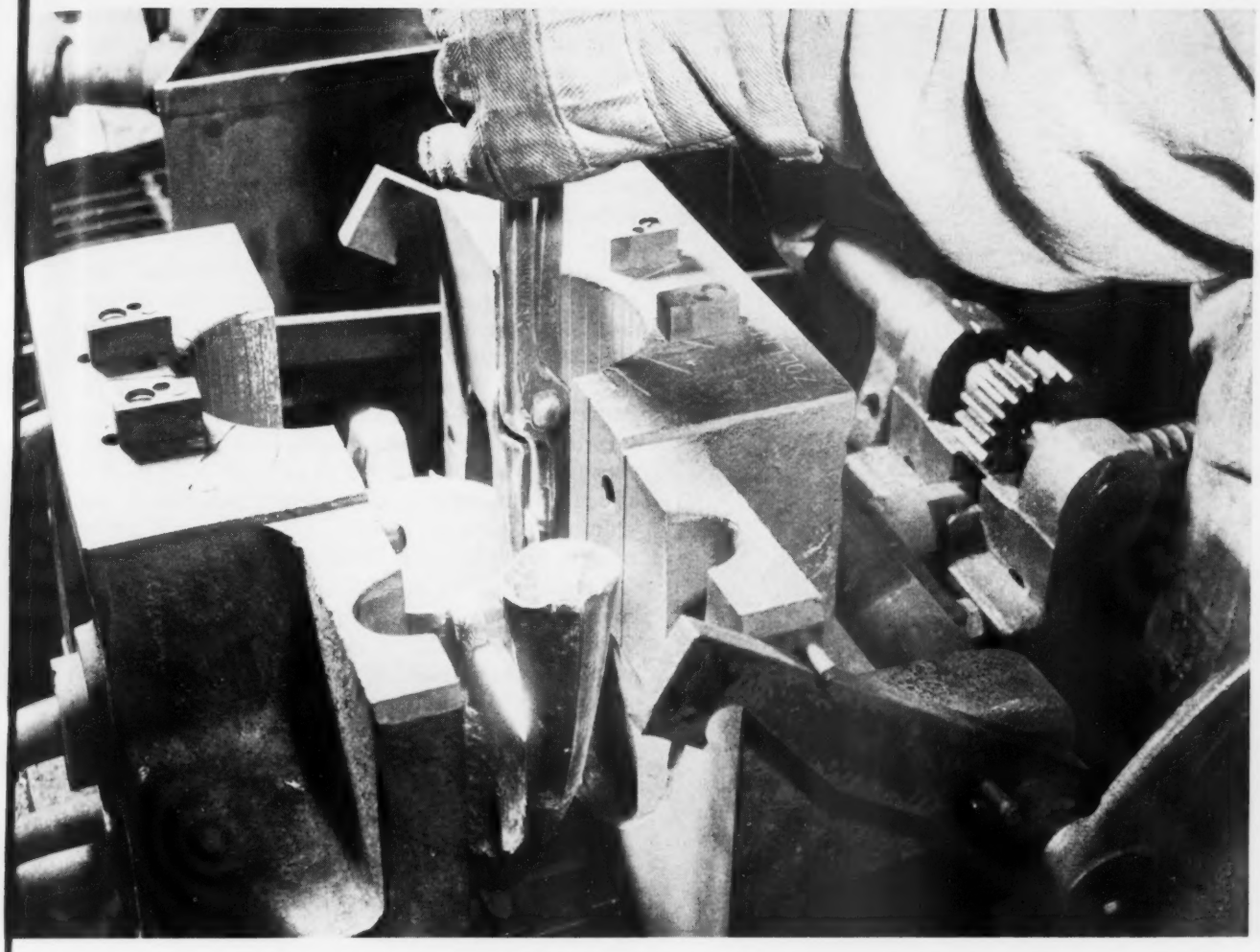
**Die Casting**—The die casting industry had its greatest production year in 1955, and indications are that 1956 will be better. Application of die castings in the automobile, appliance, electronic component, business machine, air conditioning, instrument, photography, communication and hardware fields—to name a few—has accounted for about a 33 per cent increase over previous high years in both aluminum and zinc die casting production.

Technological developments such as automatic ladling, more accurate control of time and temperature cycles, improved die design, increased locking pressures, better die materials, high-strength alloys and industry-wide standardized engineering and process procedures have gone far toward gaining an increased acceptance for die castings.

American Die Casting Institute's research foundation is carrying on a continuing program toward further improvement of die materials and the related problems of die lubrication. A critical study of methods and materials also is a never-ending project of the group as it aims to supply the industry with methods to produce maximum quality at its lowest possible cost.

With development of a large machine that can handle dies up to 72 in. in diameter, there appears to be no limit to the size and intricacy of production die castings. During the year a 6-cylinder aluminum engine block weighing 43 lb was cast and it is known that a V-8 aluminum engine block expected to weigh 70-75 lb is being engineered. The 6-cylinder block reportedly can be produced at a rate of 30-35 per hr. This rate requires about 1700 lb of molten aluminum per hour.

Color anodizing of aluminum has been perfected to provide decorative finishes that resist weathering and fading. One plant has installed a unique system of launders from a central melting unit connected to a battery of zinc casting machines. A hot-chamber machine for magnesium has been introduced and a hot-chamber machine for aluminum



Removing an aluminum casting from a permanent mold. Output of aluminum permanent mold castings has more than doubled during the last 15 years

is on the drawing boards, with introduction awaiting development of a new gooseneck material. Modified conventional machines incorporating special sealing and evacuating units are commercially producing vacuum die castings.

As the use of die castings has expanded, there has been a noticeable trend for the die casting customer to demand and receive from the supplier a complete service package that includes consultation on design of the product and all subsequent machining, finishing, assembling, packaging and shipping operations.

As the metalworking industry continues its research to lower production costs there appears to be an increase in the number of captive die casting shops. This can be attributed in part to the inherent advantages of the process in providing smooth surface finishes and accurate cast-in tolerances that eliminate additional processing steps and reduce manufacturing costs.

**Centrifugal Casting** — While basic centrifugal casting equipment has remained unchanged in recent years, the industry has not stood still and is constantly modifying and improving its techniques and processes. A southern manufacturer of cast iron pipe has developed a new process combining the advantages of the steel mold and metal flask with sand rammed methods. This technique uses a metal flask lined with a thin coating of resin-bonded sand. Flasks have a wall thickness about three times the thickness of the castings to be made. In addition to gray iron, this process is applicable to production of carbon and low alloy steel tubes, stainless steel tubes and some non-ferrous alloys.

A midwestern producer of cylinder sleeves has created a specially-designed centrifugal casting machine which, when coupled with an automatically-applied mold coating, produces gray iron sleeves of high quality and unusual surface finish.

A water-cooled machine developed in Germany during World War II for large scale gun tube production was studied recently and compared with its American counterpart and found to have some inherent advantages that might well be adapted for some applications.

One of the most significant developments in centrifugal casting in recent years might be the introduction of dual or multiple metal castings in which two or more dissimilar metals are bonded into one cylinder during the casting operation. End product is a single component having different properties in its inner and outer surfaces.

**Permanent Mold Casting**—As a process, per-

Central Foundry Div., GMC

Bonding shell mold halves. About 500 foundries are estimated to be making shell mold castings

manent molding lends itself to automatic operation and high production while maintaining quality and close tolerances. In a continuing effort to reduce costs, permanent mold foundries are using, wherever possible, batteries of automatic or semi-automatic machines controlled by one or two operators. Emphasis has moved to techniques to provide faster and cleaner melts so that sound castings can be produced at increased rates.

One company has installed a new type aluminum melting furnace that can be heated up in less than three hours, melts ingots in 24-30 minutes and provides a continuous source of metal. In this operation, the automatic melting unit is used in conjunction with automatic pouring mechanisms of permanent molds (although it can be adapted to die casting operations as well) mounted on turntables in front of the furnace. Molds are indexed to a position under the pouring ladle and poured automatically. Turntable revolves continuously.

Advantages of low fuel consumption are claimed as there is no large reserve of metal that requires heating. Castings are reported to be of the same analysis as the ingots from which they are poured and to be reproducibly uniform.

A California manufacturer has developed an electronically-controlled permanent mold casting machine that permits production of nonferrous castings at high speed and unusual precision. The machine is a gas-fired holding furnace with attachments on one side for a permanent mold and a hydraulic system which fills an attached mold by tilting the entire unit. Standard sizes are 200, 300 and 500 lb capacities at the present time.

Controls regulate molten metal and mold temperatures, pouring rate and casting cycle. Operator needs only actuate the hydraulic system to start each cycle and remove a solidified casting when cycle is completed. Weights of castings range from a few ounces to several hundred pounds. Rejects reportedly have averaged under 0.25 per cent.

Gating studies have aided the permanent mold operator in reducing pouring turbulence through use of thinner gates and lighter risers. Dense, porous-free castings of uniform microstructure are the accepted standard with the perfection of improved melting techniques. Mold materials have improved under constant study and one manufacturer supplies an alloyed gray iron mold cast to specifications and not requiring additional machining. Graphite is being used successfully as a mold material by a producer of steel car wheels.

**Investment Molding**—Sales of investment castings in 1956 will reach an estimated $175 million, 30 per cent over 1955 sales, according to the Investment Casting Institute. Considering that 1955 sales were $135 million—27 per cent over those of 1954—the industry is growing at a rapid rate.

Larger production runs necessarily have accompanied greater sales. Five to seven years ago runs of a given pattern averaged 1000 to 1500 pieces a month for investment foundries. Today, the average is 5000 to 6000. Casting size has increased, too. With the use of wax or plastic patterns, castings weighing around 65 lb have been produced. As equipment, materials and technical know-how improve, sizes will get larger.

Investment casting with frozen mercury as the pattern material permits production of intricate parts up to 300 lb and 50 in. in any one dimension. Although very small castings can be made, economics of the process make it better adapted to the larger sizes.

Other investment casting methods include the Glascast, Shaw, Investment X and Ellis processes. The Shaw and Investment X processes were developed in other countries. The Glascast and Ellis processes were developed domestically. Limited commercial use in this country does not permit evaluation of their advantages or disadvantages in competition with more established investment casting methods.

Technical progress has made intricate coring and undercutting easier than it was a few years ago. Also, cast parts have become more intricate. Tolerances of $\pm 0.005$ in. per in. on dimensions up to 12 in. are produced as a matter of course. Although this is a more realistic tolerance than early claims of $\pm 0.002$ in. per in., customers are demanding more by way of accuracy and finish.

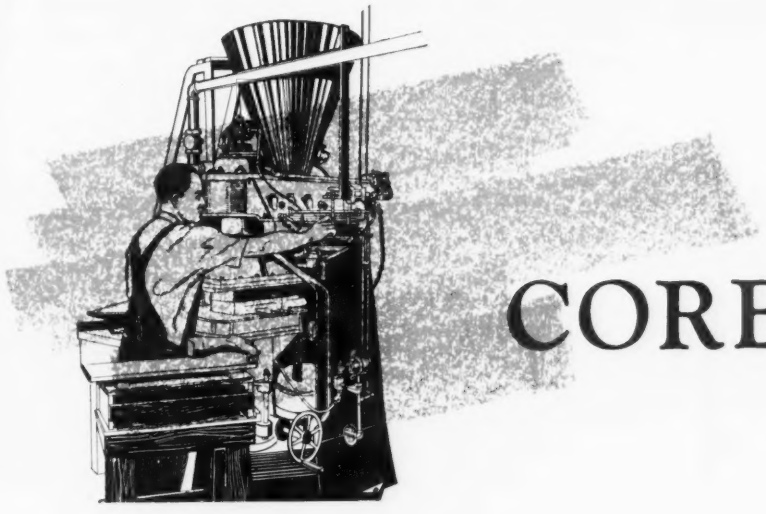
Increased casting volume has led to wider use of plastic patterns. They can be made faster, cheaper and are more durable than wax patterns. However, they cannot be made into as intricate shapes as wax patterns. High plastic injection pressure makes necessary a heavy, simple die, generally of

two pieces, which can be clamped easily for injection. Dies for wax patterns may have 60 or more pieces.

Improved materials and foundry techniques have raised casting quality to the point where scrap amounts to only 5 to 10 per cent as compared with 40 or 50 per cent a few years ago. This, coupled with larger job runs, has reduced the selling price of castings in spite of higher materials, labor and equipment costs.

The cost picture as viewed from another perspective can be illustrated by this example. At a recent ICI meeting the gas turbine development engineer of a large automotive company stated that production models of such an engine could use investment-cast turbine blades, but their maximum cost could not exceed 15 cents above material cost. Investment foundrymen present guffawed. Privately, however, one of those foundrymen said he could cast the blades at that price. With a special setup for such an operation the foundry cost could be reduced to 7 or 8 cents. Without a good-sized contract for blades, however, few foundrymen will run the risk of extending their operation in such manner.

Another cost factor results from experience. Much investment casting business has been for Armed Forces aircraft. For the services, cost is less of a factor for purchased parts than near-idealistic specifications. Consequently, investment foundries and their employees have been conditioned to a degree of perfection impractical for most commercial work. They find it difficult to offer realistic quality and cost to industrial customers. That situation is changing, however, as foundries learn more about commercial needs and customers become more familiar with advantages of investment castings.



# COREMAKING

CONSIDERABLE attention is being given to two relatively new core binders, particularly for production of large cores. One, termed cold-setting type, reduces baking time and provides relatively high green strength. It is formed of oxidizing-type oils which, upon addition of a catalyst or oxidizing agent, harden sufficiently that the cores may be handled without sagging, sloughing or sliding on the plate. The cores must be baked for a short time to complete the oxidation process, but the baking period is 30 per cent or more less than with oil type binders.

This binder is particularly useful for large intricate cores or those made with loose pieces. The need for rods in intricate cores is reduced, and loose pieces can be removed without disturbing the sand.

**Carbon Dioxide Hardening**—A second method of hardening cores in coreboxes is the $CO_2$ process, in which core sand is mulled with a sodium silicate binder and hardened by the application of $CO_2$ for a matter of seconds. Currently arousing much interest in the United States, this process already has found wide use in Germany and England.

In essence, the technique is simple, although, like any other, it is no easy panacea for all a foundryman's problems. It is based on the chemical reaction between sodium silicate and $CO_2$, in which the silica precipitates in the form of a gel and sets the sand mass almost immediately. The process requires a washed and dried sand. Upon standing, cores continue to gain strength, at a diminishing rate, as they pick up $CO_2$ from the atmosphere.

Naturally, the process has its own particular problems. The sand must be clean and dry, and the proper amount of binder to use varies with the fineness of the sand. Prepared sand cannot be left exposed to the air, or it will pick up $CO_2$ and harden. Collapsibility sometimes is a problem, but ordinarily can be handled with the addition of powdered pitch, seacoal or a similar additive.

Because cores are hardened in the box, high production requires two coreboxes and a method of applying the gas which cuts down the time required. Coreboxes must be in good condition because the cores reproduce their contours perfectly. The tendency of $CO_2$ in the atmosphere to set up the sand produces some difficulties in core-blowing, although they are not insurmountable. If the box is rough or if improper amounts of binder or $CO_2$ are used, sticking may occur. Cores should

be rammed until they are rather hard.

Although collapsibility is better with the lower melting point metals, the process has been used successfully with both gray iron and steel. Molds as well as cores can be hardened.

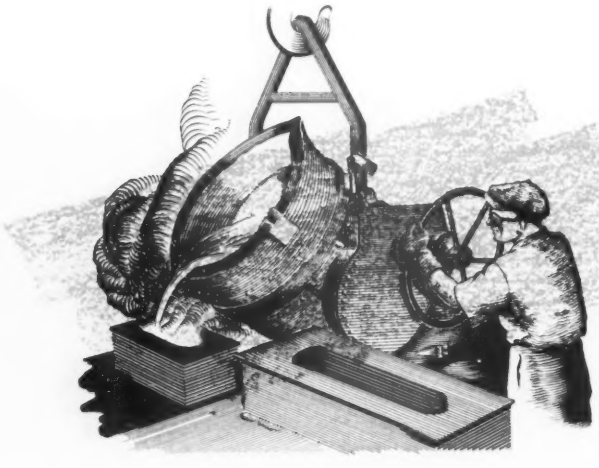
**Shell Coremaking**—Although shell cores are used less extensively than shell molds, their consumption is growing. Their application to green sand and permanent molds as well as to shell molds broadens their potential use. At least one automotive foundry is using shell barrel cores in engine block production.

Many of the advantages of shell molds also pertain to cores—smooth surface, close tolerance, sharp detail, quick curing and reduced material handling. In addition, hollow cores offer few venting problems. They collapse easily. Handling of materials can be minimized when cores are produced adjacent to the molding line and placed directly in the mold.

As in conventional coremaking, the trend is to blown cores, although some foundries are making shell cores by hand. Conventional coreblowers can be adapted to handle sand-resin mixtures by putting a slotted rubber cover over the machine blow hole. However, several manufacturers are offering machines designed for shell blowing and curing. Some cores are cured by placing the box in an oven. Curing heat also is obtained with electrical resistance heaters built into the box or with radiant gas burners mounted behind box halves. In the latter types, boxes are opened automatically and the core lifted from the box mechanically. One foundryman has developed a machine which extrudes the sand mixture through a heated die to produce ready-to-use rod cores.

Most blown cores are made with coated sands, coating being done in conventional mullers by either the hot or cold method. Some shops, however, blow cores with sand-resin blends, and many hand-produced cores are made with such mixes.

Limited experience indicates that there is no problem with contamination of green sand by completely disintegrated cores. However, shell lumps, which contain unburned resin, must be screened out.



# METALS

IN THE field of ferrous alloys, progress has been made during the last few years in providing castings with consistently uniform properties. In the case of iron this success has been achieved by closer attention to better cupola control. Measures employed include careful selection of raw materials to keep tramp elements at a minimum, attention to coke and its handling to avoid size degradation, proper placement of metal and coke and correct air supply.

Water cooling or hot blast or combinations of them are of considerable aid in maintaining uniformity of operation. Slag control through use of basic linings or water cooling without refractory can be employed either to obtain low-sulphur, high-carbon iron or to produce good gray iron when conditions are such that only low-grade raw metallics and coke are available.

**Ladle Injection**—A recent development being used to some extent is ladle injection with nitrogen as the carrier to increase carbon content, lower sulphur content and produce high-strength irons.

Carbon content is increased by injection of finely divided graphite, and sulphur is decreased by injection of calcium carbide. Both materials may be injected simultaneously to provide high-carbon, low-sulphur iron. The third variation of the injection procedure is use of calcium carbide with magnesium and/or rare earth compounds to produce high-strength irons and nodular graphite iron.

The applications of shell molding to gray iron casting production is increasing in those fields where large quantities of specific types are required and where surface finish and close tolerances are important.

**Nodular Iron**—Production of nodular iron continues to grow as increasing experience finds new applications. Greatest use is in agricultural and heavy machinery, internal combustion engines and metalworking. Present ASTM specification A339-55 designates two grades. One calls for 80,000-psi tensile strength, 60,000-psi yield strength and 3-per-cent elongation. The other has a tensile strength of 60,000 psi, yield strength of 45,000 psi and elongation of 10 per cent. Properties of the latter usually are obtained by a graphitizing anneal.

A new specification to be published soon relates

to nodular iron for pressure-containing parts for temperatures from minus 20°F to elevated temperatures. It calls for 60,000-psi tensile strength, 45,000-psi yield strength and 15-per-cent elongation. Castings are given a ferritizing anneal.

Under consideration are specifications for high-strength nodular irons with tensile strengths of 100,000 and 120,000 psi and for cast iron pipe. A newcomer in the nodular iron field is an austenitic type containing 2 per cent Cr, 20 per cent Ni and 1 per cent Mn. This material is said to possess excellent corrosion and heat resistance as well as high strength and toughness.

**Malleable Iron**—Malleable iron production in 1955 hit a new high. This record was influenced by record automotive production, but may be attributed partially to activities in converting other methods of fabrication to malleable castings and to the rapid increase in applications for pearlitic malleable. Pearlitic malleable production last year totaled 150,000 to 200,000 tons—practically double that for 1954.

At present, pearlitic malleable is available in seven grades, covered in ASTM specification A220-55T, which provides tensile strength from 65,000 to 100,000 psi, elongation from 10 to 2 per cent and hardness from 163 to 269 Bhn. Applications are in railroad, automotive, marine, agricultural and general machinery in which high strength and wear resistance with a reasonable amount of toughness are required. Pearlitic malleable also responds readily to surface or localized hardening by the usual methods.

In the field of standard malleable iron, continuing studies are being made on gating and feeding to develop efficient methods of casting production. Investigation is being conducted on elevated-temperature properties to supplement data already available on low-temperature properties.

**Steel Castings**—Steel castings production for 1955 was over 25 per cent higher than in 1954. Little, if any, shift from carbon steel to alloy steel castings is evident. About 70 per cent of production is carbon steel, and 30 per cent is alloy steel.

To consolidate and advance its position in the casting field, the industry for some time has been continuing studies of production methods, gating and risering and control procedures to provide quality castings more economically. Additionally, progress is being made in design studies based on stress analyses to supply castings which will better meet service requirements.

Some commercial application is being made of machined graphite molds for production of car wheels and of powdered silica glass and other ceramic materials for production of castings to meet requirements of smooth surface finish and close dimensional tolerances. Research has solved the difficulty encountered in applying the shell molding process to low-alloy and carbon steel castings. Indications are that cold setting core binders and carbon dioxide hardened silicate binders are being employed increasingly in production of large cores with intricate and complex shapes.

Pouring a heat of ductile iron at Bayonne laboratory of the International Nickel Co.

A new specification, ASTM A389-55T, relates to normalized and drawn alloy steel castings for high pressure and elevated temperature service. It describes two grades of Cr-Mo-V steels and their heat treatment. In the high alloy steel casting field, research is continuing to improve further the properties of heat, corrosion and abrasive resistant materials.

**Aluminum Alloys**—Increasing attention to and expansion of aluminum-base alloy casting applications are demonstrated sharply by the increase of more than 30 per cent in production last year compared with 1954. For some time, in this field, there has been a definite trend away from sand casting to permanent mold and die casting procedures. Since 1950 shipments of sand castings have increased 10 per cent, and permanent mold and die castings have increased 105 and 140 per cent, respectively.

In the aluminum alloy die casting field the trend is toward larger and larger castings. Recent report mentions production of 6-cylinder automotive blocks weighing 43 lb when trimmed which can be made at the rate of 30 to 35 per hour. Work is being done to produce V-8 blocks weighing 70 to 75 lb. Although there has been some increase in other methods of production, such as the plaster molding, shell molding and investment molding processes, they account for less than 1.5 per cent of the total production.

The aluminum-zinc-magnesium alloys have received considerable attention recently since they develop high strength without heat treatment. Five alloys of that type are used for sand casting. As shown in ASTM specification B26-54T, they are ZC81A, ZG32A,ZG42A, ZG61A, and ZG61B. They contain 0.2 to 0.7 per cent Cu, 0.5 to 1.0 per cent Fe, 0.05 to 0.6 per cent Mn, 0.3 to 2.1 per cent Mg, 3.0 to 7.5 per cent Zn,

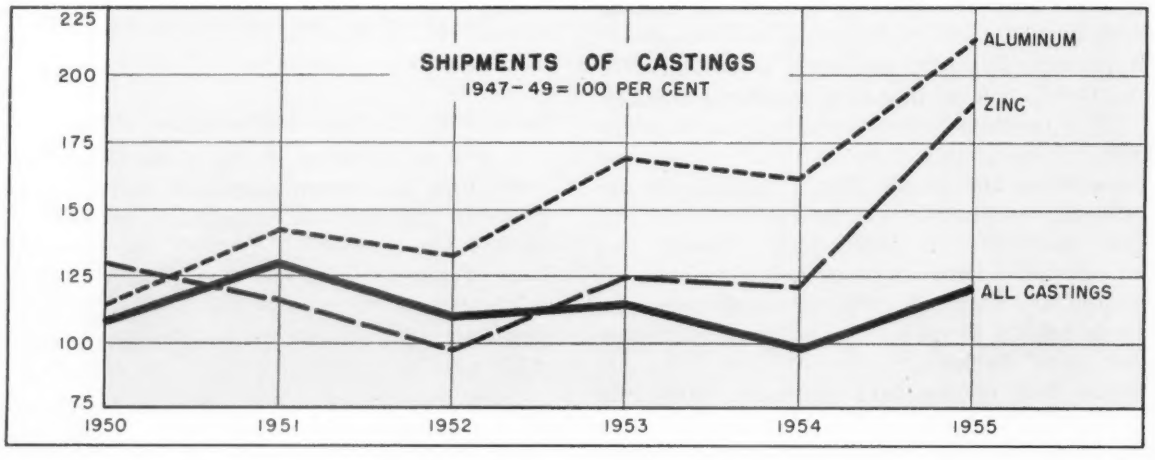
and 0.3 to 0.5 per cent Cr, except for ZG61B, which does not contain Cr. Three of those, ZG32A, ZG42A, and ZC81B also are listed in ASTM specification B108-54T, for permanent mold castings.

**Brass and Bronze**—Production of copper-base alloy castings is largely in sand castings, which account for about 90 per cent of the total. There has been a slight increase in permanent mold castings, which rose from around 6 per cent of the total in 1951 to 8.5 per cent in 1955.

In some of the alloys there is an increasing use of nickel to obtain improved mechanical properties and such others as corrosion and heat resistance. One is an aluminum bronze containing from 2.5 to 5 per cent Ni. The latter type possesses a tensile strength of around 90,000 psi in the as-cast state and is used in that condition for ship propellers, pump impellers and other large castings. The alloy also may be heat treated for higher strength and hardness.

Other alloys include the 88 per cent Cu, 5 per cent Ni, 5 per cent Sn and 2 per cent Zn and the 80 per cent Cu, 5 per cent Ni, 5 per cent Sn, 5 per cent Zn and 5 per cent Pb. In the heat treated state, they show high hardness and tensile strength.

Studies on the use of taper chills and vacuum degassing of certain copper-base alloys to increase directional solidification and improve pressure tightness are being applied commercially on a small scale. These practices undoubtedly will be extended gradually unless there is a sudden tighten-




## Aluminum Paces Upturn in Demand for Castings

LIGHT METALS and zinc have outstripped other metals in the rate of increase in shipments of castings since 1949. The trend for the last six years is shown in the chart above.

In 1955, shipments of aluminum castings were more than double the 1947-49 average. Zinc casting shipments increased more than 85 per cent. Magnesium casting deliveries since 1951 have been running three to four times the early postwar average. These gains compare with an increase of 23 per cent in shipments of all types of castings. While the percentage upturns for aluminum, zinc and magnesium are impressive, these three metals account for less than 5 per cent of all castings shipped.

Production of malleable iron castings, stimulated by record-breaking automotive activity—as were also gray iron, aluminum and zinc—set a new record last year at 35 per cent above the 1947-49 average. Gray iron shipments, only a shade below the previous record, were up 24 per cent, while brass and bronze showed a gain of less than 10 per cent over the average. Steel casting shipments, despite progressive recovery through the year, did not quite match the average of 1947-49.

Shipments of various types of castings for the last ten years are shown below.

*(Figures in net tons reported by the Bureau of the Census)*

| Year | Gray Iron | Steel | Malleable Iron | Copper-Base Alloy | Aluminum | Magnesium | Zinc | Total |
|---|---|---|---|---|---|---|---|---|
| 1946 | 10,269,657 | 1,432,049 | 752,028 | 532,798 | 194,355 | 4,236 | 192,350 | 13,377,473 |
| 1947 | 12,540,960 | 1,625,055 | 895,054 | 525,871 | 220,998 | 3,845 | 218,204 | 16,029,987 |
| 1948 | 12,785,909 | 1,759,127 | 933,265 | 515,412 | 212,245 | 4,107 | 222,477 | 16,432,542 |
| 1949 | 10,549,284 | 1,243,502 | 713,330 | 362,026 | 152,204 | 4,182 | 188,889 | 13,213,417 |
| 1950 | 12,905,562 | 1,459,382 | 920,502 | 528,486 | 226,321 | 6,157 | 268,199 | 16,314,609 |
| 1951 | 14,988,555 | 2,050,054 | 1,085,241 | 588,770 | 275,216 | 16,567 | 247,475 | 19,251,878 |
| 1952 | 12,860,494 | 1,925,707 | 926,120 | 504,952 | 259,489 | 17,428 | 204,176 | 16,698,366 |
| 1953 | 13,707,902 | 1,834,197 | 970,506 | 495,248 | 329,011 | 17,258 | 260,626 | 17,614,748 |
| 1954 | 11,532,158 | 1,184,096 | 812,016 | 417,965 | 312,486 | 12,786 | 260,250 | 14,531,757 |
| 1955 | 14,837,745 | 1,530,694 | 1,104,775 | 505,800 | 416,478 | 13,946 | 390,600 | 18,800,038 |

ing of requirements on pressure tightness.

**Magnesium**—In the field of magnesium-base castings, the newer thorium-zirconium alloys are receiving considerable attention since they withstand much higher stresses at 500 to 600°F than their earlier counterparts, the rare earth-zirconium alloys. Compositions of the thorium type are somewhat similar to the rare earth alloys except that thorium is substituted for the rare earth elements. One of the rare earth-zirconium alloys, EK30A, contains 2.5 to 4.0 per cent rare earths, 0.2 per cent minimum zirconium and the remainder magnesium. The thorium-containing alloy, HK31-XA, shows 2.5 to 4.0 per cent thorium, 0.5 to 1.0 per cent zirconium and the remainder magnesium.

Another rare earth type, EZ33A, contains 2.5 to 4.0 per cent rare earths, 0.5 to 1.0 per cent zirconium, 2.0 to 3.5 per cent zinc, and remainder magnesium. The similar thorium alloy, HZ32XA, shows 2.5 to 4.0 per cent thorium, 0.5 to 1.0 per cent zirconium, 1.7 to 2.5 per cent zinc and the remainder magnesium. Best properties of both types of alloys are secured by heat treatment. The solution heat treated and aged temper (T6) is used for those without zinc. For alloys with zinc, the artifically aged treatment (T5) is employed.

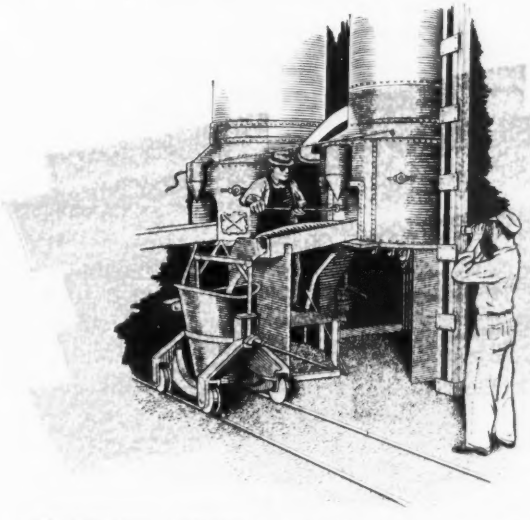
With the more commonly used magnesium-aluminum-zinc alloys, there appears a return to lower zinc content—about one-third to one-fourth that of those employed for some time. As Dr. T. E. Leontis, Dow Chemical Co., pointed out a year ago, the lower zinc alloys, AZ91C and AZ81A (0.7 per cent Zn), are not new since similar alloys were used in this country over 25 years ago, and have been in continuous use in Europe. Those alloys exhibit less tendency to microshrinkage than the higher zinc-containing alloys, AZ63A (3 per cent Zn) and AZ92A (2 per cent Zn).

As in the case of aluminum-base alloy castings, there is a trend away from sand casting to permanent mold and die casting of magnesium-base alloys. In 1954, sand casting accounted for 63 per cent of production, permanent molding 18 per cent, and die casting and other methods for 19 per cent. In 1955 sand casting dropped to 57 per cent while permanent mold and die casting increased to 22 and 21 per cent, respectively.

**Titanium**—Any reference to metals and alloys hardly would be complete without some mention of titanium. Chief interest in that metal lies, of course, in its unusual properties—the strength of steel with only 58 per cent of its weight and a corrosion resistance approximating that of 18-8 stainless steel.

At present, production costs of titanium are rather high due to involved procedures required in winning it from its ores. Also, in the molten state titanium combines avidly with various gases and elements which affect it exceedingly detrimentally. Consequently, vacuum melting and a non-reactive molding medium are essential in producing castings. Use of vacuum arc-melting with titanium as a consumable electrode permits obtaining a sufficient quantity of uncontaminated metal to pour large castings.

The search for a molding medium satisfactory for light, medium and heavy section castings still is under way. Permanent molds of machined graphite are being used, and crushed and screened graphite bonded with resin is reported to serve for sections up to 2 in. thick. Although some surface contamination occurs, it is said to be removed easily without loss of detail or adverse effect on surface finish by pickling in 50-per-cent sulphuric acid containing 25 grams of ammonium bifluoride per liter.



# MELTING

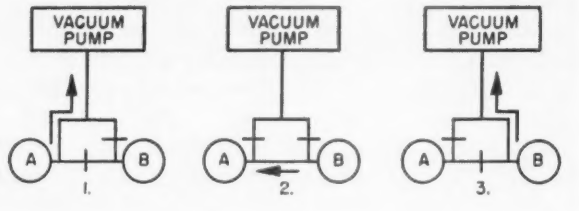
CONSIDERATION of melting ferrous and nonferrous metals and alloys does not indicate any radical or distinctive trends in recent years. Rather, it shows a better application of practices which have been known for some time.

**Vacuum Melting**—Although attention in the general field of metalworking has been directed to advantages of vacuum melting, its application in the foundry industry still is largely experimental. That method of melting is a must with titanium, molybdenum and their alloys, of course, due to their affinity for oxygen and nitrogen while molten. Only a small quantity of experimental castings has been made of those materials, however, the main accent being on ingots and billets for rolling and forging.

Although it has been demonstrated that vacuum melting or the application of vacuum to molten metal provides practically gas-free metals and alloys with a minimum of nonmetallic inclusions, the main deterrent is the large capital investment required for suitable vacuum equipment—particularly for high-vacuum, large-scale operation.

At present, it appears that in the foundry field the most likely application will be in the nonferrous branch, where considerable difficulty is encountered from absorption of gases from the products of combustion. Here, in general, the molten alloys handled in relatively small quantities can be evacuated of gases in comparatively small autoclaves which can be out-gassed rapidly.

To reduce time required and cost of operation in vacuum degassing, use of two interconnected autoclaves with quick-acting valves between them and the vacuum equipment seems a logical procedure. Briefly, the cycle, as indicated in the accompanying sketch, would be to switch relief




Use of interconnected autoclaves in vacuum degassing offers possibility of time saving

of vacuum from one autoclave to the other instead of to the atmosphere. When the pressure between the two is equalized, the valves are closed, and outgassing of the other autoclave is begun. Such an arrangement might result in a time saving of 30 per cent.

**Cupola Melting**—Turning now to the more commonplace melting practices, the cupola still maintains its position as the most economical unit for production of gray and alloy cast irons. Although a number of cupolas have basic or carbon linings, acid-lined units comprise about 98 per cent of the total. At present, basic and carbon linings are employed where low-sulphur and high-carbon irons are desired—more specifically, in production of nodular iron, in which the lower the sulphur in the iron to be treated, the lower the amount of nodulizing agent that is required. Notwithstanding that desirable advantage of the basic lining, a considerable tonnage of nodular iron is produced in acid-lined cupolas.

Application of water cooling to cupolas is confined mostly to large production operations where a continuous supply of molten iron must be available for eight or more hours. Under such conditions, the problem of refractories is accentuated by the high burnout in the melting zone. Installation of various types of water-cooling segments or tubes in that area does not prevent burnout, but does reduce the rate sufficiently so that cupolas may be kept in operation for 16 to 18 hours without danger of burning through the shell.

It should be pointed out that in the foundry industry, the full advantage of water cooling to reduce refractory consumption cannot be employed because of the need for high-temperature iron. The cooling water absorbs heat, reducing the amount available from combustion of the coke to heat the iron, and as a consequence the amount of cooling is limited to that point where it does not prevent attainment of 2700 to 2800°F iron over the spout.

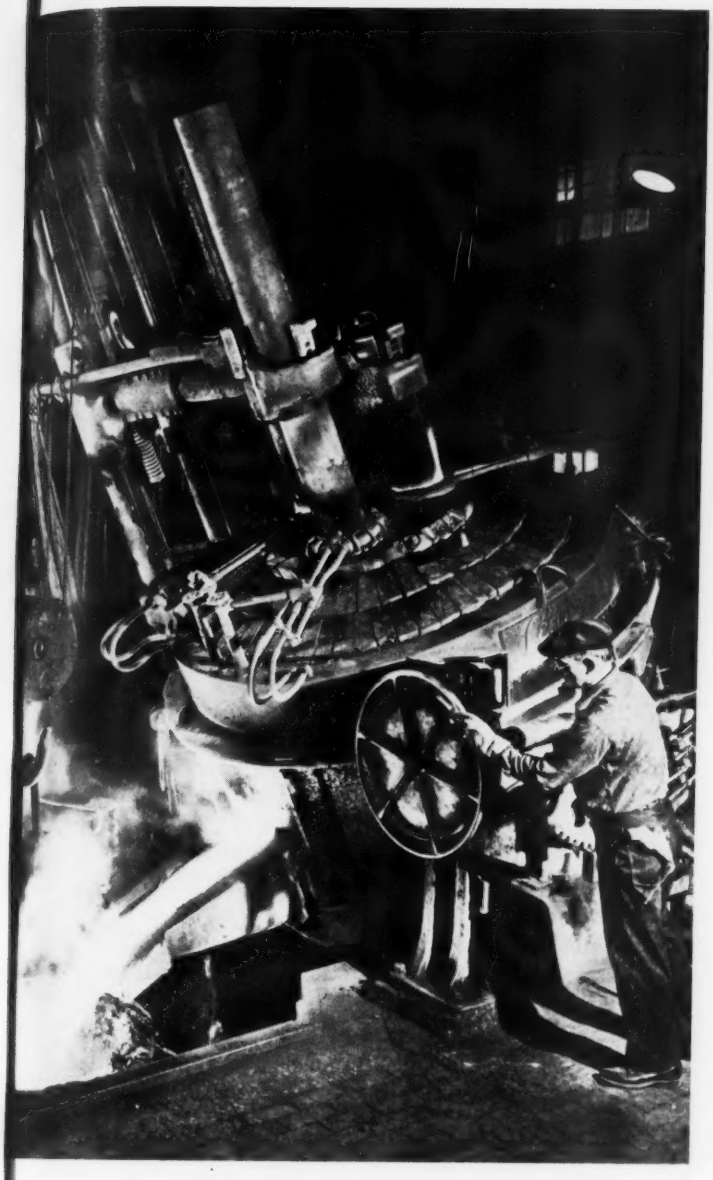
In a few instances, some cupolas are being operated with extremely thin lining or none at all. There the cooling segments are protected by a coating of slag deposited on the cold walls or tubes, as the case may be.

Hot-blast installations, like water-cooled units, are confined mainly to cupolas melting for periods of at least eight hours. Both recuperative and direct-fired types are employed. Recuperative units using gases of combustion from the cupola are more elaborate in construction. They require duct work from the cupola, and the removal of coarse dust, but heating of the blast is accomplished through the sensible heat of the cupola gases and further combustion of the CO content. Direct-fired units employ an external source of heat.

A few large installations, like the Ford Cleveland and Chevrolet Tonawanda foundries, use a combination of hot-blast and water cooling to obtain the advantages of low coke consumption, high temperature iron and low refractory cost. Those installations also are arranged to keep atmospheric pollution from dust and fumes at the minimum.

Increasing concern of many communities about atmospheric pollution has led to greater installation of smoke and fume elimination equipment on cupolas as well as on other melting units in the industry. In many areas, simple units employing water sprays appear to meet the requirements on abatement, but in others—specifically the Los Angeles district, where stringent regulations are in force—elaborate installations including closed top cupolas seem to be the only answer to present requirements. Since water spray equipment is relatively inexpensive to install and functions effectively in removing visible, coarse particulate matter, it would be to a foundry's advantage to proceed with such an installation before its neighboring community starts nuisance or worse complaints.

**Other Melting Units**—Some gray iron is melted in electric furnaces of the direct and indirect types and in large and small reverberatory furnaces. Such furnaces permit good composition control, particularly of carbon content, and are employed in production of castings which consistently must meet high physical requirements. Large reverberatory type, or air furnaces—as they commonly are called—are used mainly for manufacture of malleable iron, gray and alloy iron rolls and heavy castings. Small reverberatory types with capacities up to 2000 lb are used for making light and medium weight gray iron castings. Indications are



Tapping steel from an electric arc furnace at Crucible Steel Casting Co., Cleveland

that there has been some increase in the number of installations of electric and small reverberatory type furnaces.

In steel casting production, the acid process predominates so far as number and types of melting units are concerned. The basic process is in general restricted to castings in which low sulphur and low phosphorus are essential to obtain high impact values at low temperatures. In such castings, consistent results are obtained when sulphur and phosphorus are held in the 0.02 to 0.03 per cent range, which can be attained by the single-slag basic process. In acid steel practice, with selected scrap, sulphur and phosphorus fall in the 0.03 to 0.04 per cent range. Basic practice also is essential in production of certain high-alloy steels to insure high recovery of the alloying agents.

With acid steel practice, there appears to be a tendency toward use of ore instead of oxygen as an oxidizing agent for reduction of carbon and elimination of gases. Indications are that the reason for this substitution is the decreased demand for high production rates.

There is some increase in the installation of high-frequency type electric furnace units, primarily for the production of high-alloy steels, including the stainless types. In such units, recovery of alloying elements in the raw material charges and from ferroalloy additions is considerably higher than with other types. Some small furnaces have been selected to melt steel for shell and investment molding installations requiring rapid melting and flexibility. In one installation eight high-frequency furnaces ranging from 500 to 10,000-lb capacities are employed for melting both ferrous and nonferrous alloys. These compositions include some 27 high-alloy steels for corrosion and heat resistant applications, 24 plain-carbon and low-alloy steels, 20 nonferrous alloys and a range of plain and alloy gray irons.

Most malleable iron is melted by the duplex process, with either the cupola and air furnace or cupola and electric furnace combination, but sizable amounts are produced in air furnaces and cupolas. In duplex melting, it has been found that oxidation in the cupola, as indicated by loss of silicon, affects the rate of graphitization, and close attention is being given to keeping oxidation as low as possible.

Presence of chromium as a tramp element in purchased scrap requires spot checking of shipments, since it is a potent retarder of graphitization, and efforts are made to keep it under 0.05 per cent. If it tends to rise over that amount, small additions of boron counteract the retarding effect of chromium. Some use is being made of additions of bismuth to higher silicon irons to eliminate any tendency toward mottling.

**Nonferrous Melting**—Nonferrous melting is characterized by the wide variety of units which are used satisfactorily. They range from the natural-draft, coke-fired, pit-type crucible furnace to the high-frequency induction type. Between are oil and gas-fired furnaces using graphite, silicon carbide, and metal pots or crucibles; oil and gas-fired reverberatory furnaces in which the flame comes in direct contact with the metal being melted; indirect-arc type electric furnaces; and low-frequency induction electric units. In some installations several different types of these melting units are being employed for the same or different alloys.

Because of the great tendency of practically all nonferrous alloys to gas absorption—particularly hydrogen—melters endeavor to maintain a slightly oxidizing atmosphere over the molten metal in the furnace. In addition, some use solid or gaseous degasifying agents. Many foundries cast chunky test plugs to observe presence of gas absorption, as indicated by lack of proper "pipe" or shrinkage void in the top. A newer procedure is to use a small vacuum unit in which a sample of molten metal or alloy is placed. Under the low pressure the contained gases in the metal expand greatly and show up as large bubbles when the solidified specimen is sectioned. Also, during evacuation the presence of gas is indicated by ebullition on the surface of the molten metal.

# *Higher Efficiency through*

# MECHANIZATION

**With much of the necessary equipment already available, foundries rapidly are becoming mechanized production operations. Future developments will push this trend still further**

ONCE a laggard in the mechanization race, the foundry industry now is sprinting toward the goal of automation engineered to provide more castings of higher uniform quality with less manual effort. The movement started during and after World War II when demand for castings was high and labor supply was short. Later, in a growing market, the sharp prod of rising costs gave additional impetus.

Another factor is more intangible. As the national economy galloped to new peaks, optimism flared. Money was plentiful and easy. Families wanted automatic kitchens, automatic laundries, two cars with automatic transmissions. They joined country clubs, took longer vacations to distant places, worked shorter hours. Work hours had to be more productive to furnish the products for a higher and higher standard of living. Caught in this fever of optimism and progress, industry leaders, big and small, came up with the most logical answer—mechanization.

Link-Belt Co.

In this mechanized system, mold is sheared off bottom board and discharged to shakeout screen

**How Have Foundries Fared?** Today's equipment can provide a highly automatic foundry. Machines and transfer devices exist for automatic molding, core making, sandmixing, core setting, mold closing; continuous melting and mold pouring, casting shakeout, movement through blast cleaning machines and heat treating furnaces, parts testing and delivery of castings to shipping containers.

No foundries use all of this equipment. Only a few use most of it. Practically all foundries, large or small, production or jobbing, use some of it. An important fact, however, is that almost all foundries are on the mechanization band-wagon. Old-time concepts of foundry work as a batch operation are giving way to straight-flow production concepts. As that trend continues, mechanization in all its stages will expand.

**What Is the Progress to Date?** In green sand work, some molding machines automatically make up to 300 mold halves an hour. A Swiss machine is said to be capable of 600 an hour. These high-speed machines usually are incorporated in a molding system which automatically supplies flasks to the machine, measures sand into the flasks and removes the half mold. Some have automatic core setting and mold closing devices. Copes are removed from poured molds, drags are dumped automatically and sand is shaken away from flasks and castings. Empty flasks return to molding machines on power or gravity conveyors which also handle half and complete molds through the processing operations.

Sand is moved by oscillating, belt, pneumatic or chain conveyors and bucket elevators. It is reclaimed and processed ready for use automatically with no need for human effort. Conveyors of many types carry castings from shakeout into and away from automatic cleaning machines.

Small shops, using comparatively little equipment, can improve their efficiency noticeably. A 27-man nonferrous foundry recently installed an

This installation is in operation in the malleable foundry at the Chicago Works of Crane Co. Sand mixing equipment is handled automatically from this control board

oscillating conveyor for dumped molds, gravity roller conveyors for mold set-off and flask return and a sand preparation and distributing system. Ten tons of brass and bronze are poured daily in the foundry.

Some shell molding foundries, being comparatively new on the scene, are starting out with the degree of mechanization only recently achieved in green sand shops. Those foundries have the automatic machines and mechanized conveyor loading, unloading and shakeout features of green sand shops. Shot backing and sand bedding are done automatically. In addition, mechanized shell foundries possess a desirable feature of automated lines—mold storage, which avoids complete shutdowns if a part of the molding line becomes inoperative. In one foundry, molds are pushed off a transfer conveyor to a storage conveyor and back again, as the need is determined by mechanical devices, and into a lowering device to be placed on a pouring conveyor. All operations are automatic.

Other developments for mechanized foundry operation include brinell testing systems which convey castings under the indenter, spray them with paint to indicate whether they are within or outside the range and convey them away from the unit. Sonic devices which test for voids and cracks perform in the same manner. So do ultraviolet light testers, although an operator is required to observe each casting. An automatic melting system for aluminum foundries conveys ingot to the controlled melting unit. Molten metal flows into a ladle and is poured automatically into permanent molds. Automatic pouring devices for ferrous metals are in the process of development.

**What Does the Future Hold?** A high percentage of automatic equipment is operated by air cylinders. Exhaust from the cylinders and operation of the handling devices create noise. This has sparked a trend which may go far in mechanized shops—sound-proofing. Foundry operators are installing exhaust silencers on air equipment. New squeeze molding machines produce dense molds without the need for jolting. Individual noise-creating operations such as grinding, chipping, tumbling and shakeout are being isolated by acoustical enclosures. One new foundry, just now getting into production, has acoustical material on walls and ceilings.

Exhaust systems to keep foundry atmospheres clear have come a long way, and much progress is being made on control of fume and contaminant emissions to the outside air.

The foundry industry has progressed far up the road of mechanization and modernization, and a continuing trend in that direction appears certain. It must if customer quality and cost requirements are to be met and foundries are to hold and expand their share of the industrial market.

# MANAGEMENT

## *Makes the Difference*

**More than any other single factor, the quality of management determines whether a firm is outstanding, mediocre or weak. This report describes some of the ways in which foundry managers are using vision and imagination to do a constantly better job**

NO LESS than other segments of American enterprise, the foundry industry has undergone far-reaching changes since World War II. As the other articles in this special section show, change and complexity have been the order of the day. Inevitably, the problems of foundry management also have become more complex, and demands on the imagination and ingenuity of management are more numerous each year.

**Management's Functions**—Basically, of course, management has one over-riding function: To earn a profit. But successful management has two other, more specific functions: 1. To recognize the nature of its challenges. 2. To determine and carry out courses of action that will meet them.

Of the two, the second undoubtedly is the more difficult, but neither is simple. We can be sure, however, that the success of both the industry and of the individual firms which comprise it will depend on how well they meet these interlocking problems. Happily, much of foundry management has proved its willingness and its ability to do so.

One of the more important evidences of management progressiveness has been the increasing strength and activity of the trade associations which represent the various sectors of the industry. These groups exist to help management do a better, easier job. Although they vary in their activities and in the emphasis they give them, generally these groups are concerned with such areas as research, product and market development, safety, technical operation and representing their members to government.

In the long run, management's real job is to make policy and to provide the supervision that will insure its execution. A picture of the real difficulty of the task begins to emerge when we list the number and diversity of the areas involved. They include merchandising, personnel recruitment and training, costing, safety, public relations, personnel relations, research, quality control and a good many others. What is successful foundry management doing about these problems, and what is it likely to be doing in the future?

**Merchandising** — Foundrymen traditionally have been production-minded people, management no less than shop supervisors. In fact, because many foundries have been small businesses, the positions of president and superintendent often have been held by the same person. In many small shops, they still are.

The importance of production cannot be minimized, of course. A company with no product has nothing to sell, and a company with a poor product is little better off. Merchandising, however, is pretty important, too. It's undebatable that products are made to be sold, not for the simple joy of making them. That point brings us back to the profit-earning motive. Some foundrymen are inclined, nevertheless, to look with distaste on the selling function. Maybe that's how some of the industry's lost markets got that way.

Both individually and as an industry, foundrymen are becoming more profit-minded, doing a more aggressive, more informed, more effective selling job of cast products. This activity takes various forms.

Individual firms are beefing up their sales forces. More and more have realized that salesmen must be informed about their products, that they must know how they are produced and what they can do, where their limitations lie and what advantages they have over other forms of fabrication. That type of salesman can sell intelligently and from a position of strength.

To this end, many foundries have revised their concepts of what makes a good salesman. Where glibness may once have sufficed, management in-

Rockwell Mfg. Co.

creasingly requires a good technical background, then supplements it with training which insures that salesmen know what they're doing. This type of training is certain to become more widespread. With it, salesmen can meet effectively the challenges of competitive types of fabrication.

Advertising is another major selling tool, one which has not been used adequately by foundries in the past. Today, however, both individual firms and trade associations are taking their messages to designers and engineers in the rest of industry. Companies stress their production facilities and services; the associations point out the applications for which their members' products can do the job and the advantages they offer. One point about advertising: Misleading claims only hasten the day when the whole potential market has sampled a product and rejected it. Advertising isn't likely to sell an over-rated product more than once. After the first time, the product has to sell itself.

In selling, service to the buyer often is as important as the product itself, and it too takes various forms. One which has found widespread acceptance in recent years is co-operation between foundryman and designer to insure that castings are designed in the best way possible for a given application. Such co-operation can avoid a lot of headaches for everyone concerned and may enable the foundry to make a better product more easily and at a lower reasonable price than it otherwise could.

When the foundry is willing and able to co-operate with the designer, both benefit. Working together, they can eliminate needlessly close tolerances, avoid hard-to-cast alloys if another will do as well and set up gating and molding practices that will cut costs by reducing scrap. In this area, brittle lacquer and strain gage tests have been winning popular favor in recent years. They enable the foundry to put strength in a casting where it is required, thereby cutting weight and insuring good performance. Management seems likely to enlist such aids more commonly in the future.

In their selling efforts, profit-minded, forward-looking foundrymen are abandoning a type of selling which has plagued the industry for many years—selling based entirely on price. In addition

General Motors Corp

In-plant training programs concern production, safety, management problems and similar areas

to the basic fallacy this type of selling involves, it can lead easily to price-cutting as a sales tactic, and the disastrous and vicious cycle that it engenders is too obvious to require comment.

Production-minded management is particularly likely, however, to fall into the habit of selling at the lowest possible price, forgetting too often that production is only a means to an end—namely, selling the product at a reasonable profit. When management regularly sets the lowest possible price on its products, it exposes itself to danger. Rejections and rising labor, materials and overhead costs can spell disaster. Progressive management is providing a good product and selling it at a good price. Any other policy hurts the industry as well as the individual company.

**Costing**—Setting a reasonable price demands, however, one important prerequisite: Knowing production costs. The charge often has been made that some foundries send a portion of their capital out the door with each batch of castings they ship. So, probably, do some companies in other fields, but that condition doesn't help the foundry which is selling itself into bankruptcy on a wave of prosperity. There also is another, but more unlikely, side to the coin: Prices which are unreasonably high, even through ignorance rather than avarice, can turn customers to other forms of fabrication. Foundry management, like any other, needs to make the best possible product at the lowest reasonable cost—and it must know that cost.

Accountants are pretty much in agreement that the proper way to price castings is on a per-piece basis. Using other methods can cause this sort of situation: Foundry A charges by the pound. As a result, its prices are low for light, complex parts which require a lot of labor, and they are high for uncomplicated, heavy work in which labor costs are relatively negligible. Foundry B, on the other hand charges on the basis of its direct labor costs. Its prices are high for the light, complex work and low for the uncomplicated jobs. Neither has anyone but itself to blame if customers buy complex castings from Foundry A and uncomplicated ones from Foundry B. Per-piece costing would avoid this sort of financial Russian Roulette.

The only answer to the problem is, of course, efficient costing. A foundry which doesn't know its costs is trying to make castings in the dark, and may very well be making them in the red. Intelligent foundry management is largely aware of this elementary fact of business life, but more will turn their attention to it.

In this connection the foundry trade associations have been active. Cost manuals have been compiled, for example, by the Gray Iron Founders' Society, Malleable Founders' Society and Non-Ferrous Founders' Society. Each of these organizations also sponsors a consulting service which aids members having difficulty figuring their costs. Cost clinics and discussions are regular features at regional management and cost meetings of members of certain groups. These types of activity seem

A common and effective type of public relations activity is the open house

**Management's One Over-riding Function Is To Earn a Profit**

**But its real job is to establish policies and to provide the supervision that will insure they are carried out. In addition to manufacturing operations, these policies embrace:**

1. Merchandising.
2. Costing.
3. Personnel and Training.
4. Public relations.
5. Safety.
6. Research.
7. Quality Control.

more likely to increase in the future than not.

Even among the big majority of foundrymen who do know their costs, different ideas exist about pricing. Mention already has been made of the production-minded manager who often feels that the right price is the lowest possible one at which he can make a bare profit. Another problem involves the manager who makes a large variety of castings for one customer.

He cannot lose sight of the fact that money is made on the customer more than on any individual part, but he should be aware of the realities of the situation, including the fact that the customer may one day pull out some or all of the profit-makers and leave him holding the headaches. The safest rule probably is to keep prices high enough so that any job can stand on its own feet, but achieving that goal isn't always easy. Again, complete knowledge of the cost situation is the only safeguard.

**Personnel and Training**—Any attempt to list the various aspects of the management function in the order of their importance probably is a pretty futile business. Good management properly feels that one is as important as the other. But recruitment and training of personnel are basic in nature. Any company's most valuable single resource is the skills, capacities and creativeness of its people. This point is particularly true of the management team.

Perhaps no other area has received so much attention in recent years as the recruitment of engineers, an activity directly related to the much discussed transition of casting production from an art to a science. Establishment of the Foundry Educational Foundation nine years ago was an exceedingly progressive step in this campaign. The foundation has had two notable goals besides the aim to increase the quantity and quality of foundry instruction and facilities: 1. To interest some young engineers in the foundry industry as a career. 2. To make the others aware of the nature of castings and their applications. Every indication is that both goals are being achieved.

Efforts to recruit engineers have not been universally successful, for a variety of reasons. For one thing, as everyone knows, engineers are in short supply. For another, many foundries have not gone about their recruiting effectively. The time to look for engineering personnel is long before they have been graduated, not afterward.

Most schools hold their recruiting periods from November through about April, and prospective employers should begin to make their arrangements as early as the previous July. At that time, letters should go out to the placement directors of the colleges concerned. Letters should include details about the company and its specific job requirements. The school then will co-operate in setting up a mutually convenient date for a company representative to visit the campus and make his interviews. The technique of the interview is a separate problem, of course, and requires a good representative.

Another problem is that engineer training is becoming more theoretical than before. Students must cover so much ground that they have little time for large amounts of shop and lab work. As a result, in-plant training becomes more vital, especially in summers. It should be pointed out, however, that such training is for familiarization, not to make production workers of engineers.

Further, all industries may have to look to men who have some specialized training, as at technical institutes with two-year courses, for their foremen and for line supervision in general. Management should be cautious, though, about bringing men in at the supervisory level. Company after company has discovered that promoting from within the organization is the best practice. It increases incentives and provides better qualified supervision.

**Personnel Relations**—Recruiting personnel is only the first step in building an effective organization. Some years ago the AFS adopted the slogan, "The foundry is a good place to work." The slogan unfortunately has not always conformed with reality. Most foundries are making sincere efforts to live up to it, but the few which don't can undermine the work of the many who do.

The importance of good personnel relations seems obvious to most foundrymen, as it does to management of most companies of any kind. Workers who like their jobs and their employers are more likely to be productive and efficient than those who don't. When employees don't like their jobs, they leave them as soon as possible, and

Continental Foundry & Machine Div.

Safety programs not only reduce human suffering, but also slash insurance and compensation costs

labor turnover is expensive. In addition, the end result of the process, at least in periods of peak employment like this one, is that employers with poor personnel relations wind up only with workers who can't get other jobs.

Good personnel relations must be striven for consciously, but progressive management seems to have found that the effort pays off. The basic elements are clear—good working conditions; capable, helpful supervision; adequate sanitary facilities; medical care; and any other factors which apply either wholly or largely to working hours. Beyond these, many foundries have felt it worth while to aid recreational programs, credit unions and other types of activity for which they are not directly obligated.

**Public Relations**—Closely related to the personnel relations effort is the relationship of the company to the community. One of the best advertisements a firm can possess is, of course, a work force which likes it well enough to act as unofficial ambassadors. That's one of the indirect benefits of good personnel relations. But a lot more can be done, and a lot of foundries are doing it.

Public relations has been defined as the ability of a company "to live in a community as a good citizen and to tell the people about it without bragging and in such a way that it commands respect and is regarded as a desirable neighbor." Means of accomplishing this end are numerous.

One of the most common public relations activities is the open house. Students, service clubs, teachers, whole communities, employees and families, customers and vendors, local government officials, the clergy, chambers of commerce, young people's groups and many others are among those to whom invitations most frequently are extended. The value of the open house has been proved time and again by foundries, and it should be used by many more.

It can dissipate the idea that the plant is not a good place in which to work and, properly staged, can draw attention to the essential character of the castings being produced. Visits of employees' families produce pride in the work the employees are doing. Young people are made aware of the industry and its opportunities as a career. In addition, the plant gets a good cleaning up if it should happen to be in need of one!

In the latter connection, although the observation belabors the obvious, it is pertinent to note that a well-kept, attractive plant is one of the best forms of good public relations. Areas littered with slag, scrap, old sand, battered flasks or any other untidy array brand a company as an industrial slum.

Another facet of good public relations involves keeping the community as a whole informed about what a company is doing. Talks by company representatives to local groups, releases on matters of interest to newspapers and television and radio stations and participation in civic movements are part of this type of activity.

**Safety**—Closely related to personnel and public relations are safety programs. Accidents, particularly those bad enough to make the newspapers, are not good publicity. Safe operation won't get as much newspaper space, but it pays off in the long run. It not only reduces human suffering, but it also cuts insurance and compensation costs. And only management can make a safety program effective. Where management is passive about safety, so is everyone else.

Fortunately, the record offers pretty solid evidence that most foundry management is not passive. All the foundry trade associations and their members devote considerable attention to the problem, and their efforts are getting results. Both the Steel Founders' Society and the Malleable Founders' Society have received National Safety Council top awards for their safety work. The malleable founders, for example, reduced their frequency rate 50 per cent in five years and 28 per cent in 1954 alone. The steel founders cut their frequency rate from over 40 in 1943 to 16.2 in 1954. The other groups and individual foundries are doing similar work.

National Safety Council figures for its members reveal that the foundry industry's accident frequency rate in 1947 was 25.07 (disabling injuries per 1 million man-hours). In 1954, the last year for which figures have been released, the rate was slashed to 8.81, or about one-third the 1947 rate. In the same period, the average frequency rate for all industries declined only a little under 50 per cent—from 13.26 in 1947 to 7.22 in 1954.

The 7.22 figure for all industry indicates, however, that foundries still have room for improvement: The casting industry's figure still is higher than the average for all industries. In addition, these figures apply only to foundries which are members of the council—companies more than casually interested in their safety records and in doing something about them. Their records are much better than the average, but they are indicative of what can be done.

In fairness, we must concede that probably many more opportunities for accidents are present in foundries than in some other types of plants. Yet, many foundries, some of them very large, operate for a year or more without a single lost-time accident. Foundry management has its job cut out for it in the field of safety.

**Research**—One of the more interesting recent developments in the industry has been management's increasing absorption with research. This activity has taken several forms and has included both "pure" or basic research and developmental research. Individual firms and the various trade associations, as well as the American Foundrymen's Society, have participated, with much of the work done by outside agencies commissioned to make particular investigations.

This interest seems likely to increase and to offer foundries a means both of improving their product and of exploiting its applications. It must be pointed out, however, that research findings have little meaning or value unless operating and sales personnel use them.

**Other Areas**—We are by no means at the end of the long list of functions which are primarily the concern of management. Such areas as quality control, preventive maintenance and production control, for example, are vitally important and are receiving more and more attention. Quality control can raise the quality of product at the same time it cuts costs by reducing scrap and lost customers. Preventive maintenance can stop expensive downtime losses at the same time it avoids costly repairs. Production control eliminates tying up capital which thereby can be put to work elsewhere.

Progressive management is working in all these areas, and its efforts are showing results. Management which does not do so stands in grave danger of falling behind, and disaster usually is the fate of stragglers. The wolves of competition pull them down.

Foundry management today is working hard to catch up with technology, as it must, for the good of the industry as well as that of individual firms. In this day of competition with other forms of fabrication, marginal foundry operations can menace the well-being of the entire industry. Vision and imagination are overwhelmingly vital. There are many signs that foundry management is bringing them to its work.

Recruitment and training of employees are basic management functions. Any company's most valuable single resource is the skills, capacities and creativeness of its people

Ford Motor Co.

# *Here's What*

# FOUNDRYMEN

## *. . . To Do a Better Job*

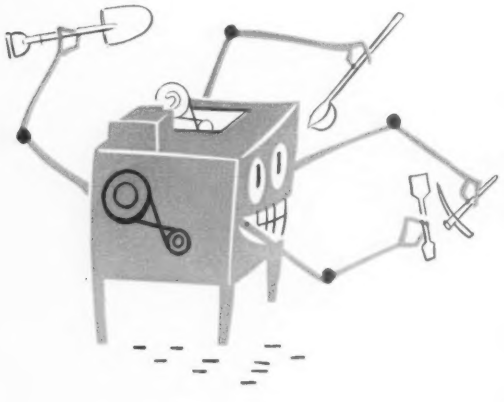
**Better equipment, supplies and service are considered necessary by foundrymen in their attempts to improve casting quality and boost production to meet the demands of an expanding market**

BELIEVING that a better understanding between equipment manufacturers and users of such equipment can be mutually beneficial, the editors asked a number of foundrymen, "How can foundry equipment manufacturers be of greater help to the foundry industry?"

Comment was favorable and unfavorable, reasonable and unreasonable, constructive and damning. All of it shows foundrymen's immediate desires and trends in their thinking. The opinions expressed provide the basis for this article.

**General Comment**—Many of those who replied to the question believe that certain factors in the industry have become more important than before, making necessary a broader basic approach to foundry needs. They say that costs must be reduced, casting quality improved and equipment developed to meet production requirements in the face of the manpower shortage forecast for the next decade.

Original, operating and amortization costs of new foundry equipment must be lower than present levels per unit of production, some users maintain. In addition, they feel, equipment must offer flexibility of operation for jobbing shops, and new designs should be based on research into the needs of foundries of all sizes.



**"Equipment must offer flexibility of operation for jobbing shops."**

One charge is that most modern equipment is designed for the large producer, although the average foundry in the United States and Canada employs about 70 persons. Further, that most currently available equipment is beyond the financial reach of small shops. It is felt that manufacturers should concentrate new designs on equipment for small shops, which offer a relatively virgin field with high sales potential. Labor-saving materials handling equipment is said to constitute a large segment of that potential market.

Another view expressed was that foundrymen should consider whether or not they are using their present equipment to best advantage. "If the same attention were paid to existing equipment as is paid to new equipment, would not the results be surprising? Equipment of most manufacturers and its use in large foundries have made great progress during the last quarter century. But jobbing foundrymen must realize that they must improve production procedures to keep pace with equipment development if casting quality is to go up and costs go down."

In commenting on the labor shortage problem a foundry operator said, "Although we have an apprentice program, we could not train enough men to maintain the skilled help we would have needed if we had not purchased labor-saving equipment in recent years. Getting young men into the foundry is not too serious a problem. The difficulty is in keeping them."

**Meeting the Needs**—Some foundrymen feel that equipment manufacturers, generally, are doing a

# WANT

## FOUNDRYMEN *Say—*

They would like to have from equipment manufacturers:

1. Versatile machines for small shops.
2. Better designed and engineered units.
3. Improved sales and service policies.
4. Equipment easier to maintain and run.
5. Complete machines, ready to operate.
6. Automation for small and large plants.

fine job of anticipating and meeting the needs of foundrymen. These users point to the wide choice in machinery for sand preparation, plus controls to assure uniform quality of mix. Similar latitude is cited in equipment for mold and core making, with the result that automation is almost a reality. Pouring, shakeout, blast cleaning and heat treatment also have seen significant change for the better. But, it is added, many avenues remain open for improvement of equipment.

It is pointed out, however, that foundrymen could do more to help themselves by showing more interest in new developments and by investigating more thoroughly equipment and services that are available. "Foundry work seems to require a lot of manual labor under working conditions, which, if not carefully controlled, would be undesirable."

**Areas for Improvement**—"The full benefit of cost saving equipment often is reduced by the high cost of maintaining the machines," one operator maintains. "Too often equipment is built for ease in manufacture and erection, with replacement of parts, maintenance and lubrication secondary. This is reverse thinking, since manufacturing and erection costs are borne only once, whereas maintenance is a continual expense."

**"Greater thought should be given to automatic lubrication of machines."**

Foundrymen feel that equipment makers should give greater consideration to means for lubricating their machines. Automatic lubrication systems, extensively employed, would result in longer life and lower maintenance cost, they say. Such systems could be offered as an extra on equipment, as are automatic transmissions on automobiles, it is suggested.

Another man feels that equipment builders are faced with an eventual saturation of their market unless they can produce new models which will be attactive from either a cost-reduction angle or a means of increasing production. Equipment which will be less likely to break down and thus eliminate costly loss of production, and equipment less expensive to maintain, should prove attractive to the industry, it is felt.

The biggest complaint of a large automotive foundry is the amount of downtime experienced and the vast amount of maintenance required to keep equipment running. Its equipment is less than two years old. The feeling at this plant is that manufacturers must improve their equipment if it is to meet standards required by automation. "Foundries gain nothing when they buy equipment to save labor and increase production, then find that they must use greater amounts of skilled labor to keep the equipment going."

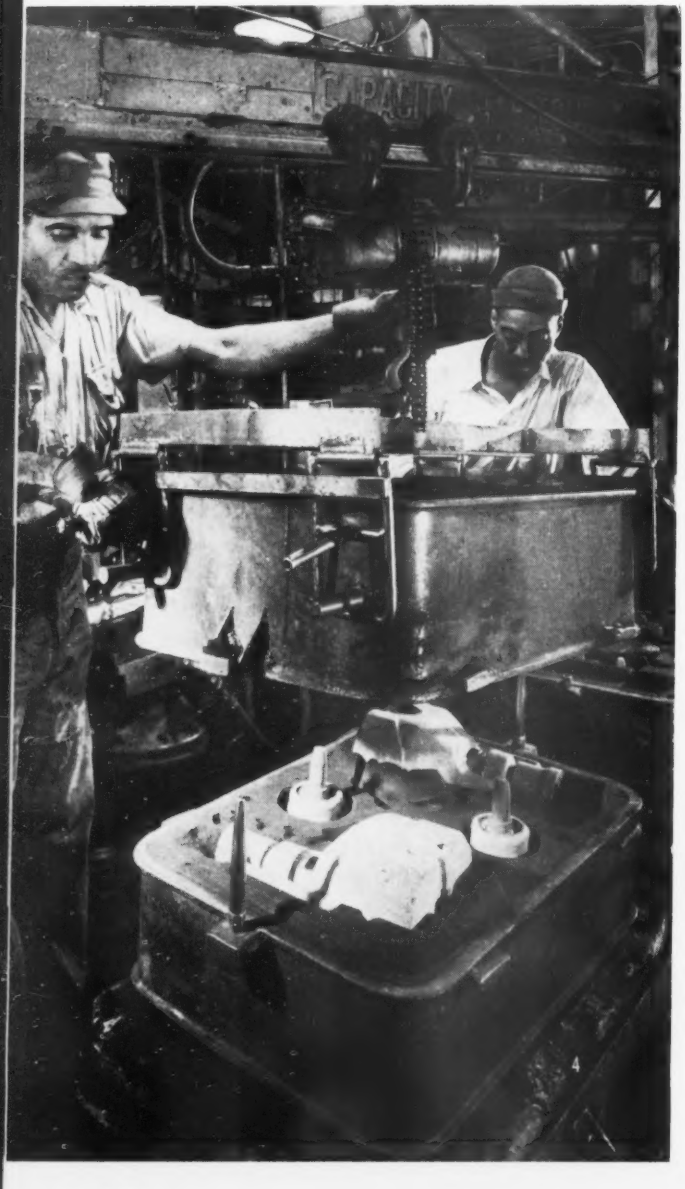
A major complaint is that equipment manufacturers are too optimistic in their claims of cost saving and production to be expected from the equipment they sell. There is said to be a tendency on the part of manufacturers to upgrade the capacity of their equipment, probably to meet price competition.

As one user puts it, "It has been our sad experience in recent years to be forced to work out production claims after the equipment is in the foundry. It is evident that equipment manufacturers are depending on the foundry customer to perform the final phases of equipment manufacture and testing. This certainly must create a hardship on the small foundries. Also it is embarrass-

ing to operating people and to the equipment manufacturer. Top foundry management is expecting results from equipment based largely on what the equipment manufacturer says it will do, and often the question of shakedown time is not mentioned."

Others say that all quotations submitted by equipment manufacturers should be complete and accurate. They add that too many times machines are delivered without miscellaneous equipment such as hoods, guards, motor controls and other parts needed for successful operation of the equipment. That lack sometimes is said to make the total cost higher than the quotations of other bidders who may include the items but not mention them.

**Better Service Wanted**—Some old-line companies with good products are charged with having become complacent regarding service. Foundrymen say that often it is necessary to go to the top man and insist on service rather than have it given cheerfully and as part of the product sale. They feel that the proper attitude toward good service should start with top management, from where it will filter down through the entire organization.



**"Foundrymen should be more interested in new equipment."**

"Too many foundry equipment sales people still think that the universal sales appeal is contained in some 90 proof bourbon rather than in a constructive approach to the customer's problem."

Equipment users feel that makers should have service representatives available locally or, if that is impractical, salesmen should be trained in the complete operation and maintenance of the equipment. One foundry puts it this way: "It is most frustrating to have a piece of new equipment which has been in operation for a few months suddenly stop functioning and, while the plant grinds to a halt, to have the local salesman look over the equipment and admit he knows nothing about its operation, but he will call the factory 1000 miles away and see what can be done."

Also it is said that equipment builders are negligent in giving fast service for repair parts and, therefore, should have larger inventories and, perhaps, more distributors. A need is said to exist, too, for more sales representatives with engineering and foundry backgrounds and thorough knowledge of their own products.

"Equipment should be shipped on railroad cars or trucks which the average foundry can unload," one foundryman declared. "If a 10-ton item is shipped in a boxcar or covered van, how can a foundry with a 3-ton lift truck or no lift truck at all hope to unload it? Most ferrous foundries have an overhead yard crane which can unload a flat car or open truck. Equipment makers should heed shipping instructions given to them by foundries."

The suggestion was made that suppliers furnish complete and accurate blueprints for foundations, piping, electrical requirements, setup instructions and operating procedures before shipping equipment. Then equipment could be installed as soon as it is delivered. Foundries also want assurance that the blueprints furnished apply specifically to the equipment furnished.

**Equipment Design**—"I am amazed at the poor quality of workmanship and the lack of sound engineering in some foundry equipment," bemoans one operator. "Today, more than ever before, equipment manufacturers must engineer greater endurance factors into their equipment as the move

to automation gains momentum. The operator of a large automotive foundry told me it took approximately a year of changing a new equipment installation before he could run an 8-hr shift without some piece of machinery failing to do its part in the automation line. His comments were that these machines are not designed for continuous uninterrupted work."

Another foundryman had difficulty with a new equipment installation. He feels that some of the trouble could have been avoided if a little more thought had been given to engineering prior to construction of the equipment. For instance, the oscillating conveyor which takes castings from the dumping position to the shakeout was too light for the job and was continually breaking down.

"We believe the equipment company recommended this particular conveyor to keep the installation price down. Eventually, the company replaced the light conveyor with a heavier unit at no charge to us. However, loss of production, during the time that we were down because of breakdown cost us two or three times more than the original cost of the heavier conveyor, and in addition we were down for another week changing the conveyors. In other words, poor sales policy and improper engineering cost the equipment company and ourselves several times the difference in cost between the two conveyors."

In addition to the desire for better engineering, foundrymen would like equipment manufacturers to conduct test runs on equipment prior to delivery or provide that tests be included in the installation agreement. "As it is now, we labor under the false expectation that newly installed machinery is ready to produce at claimed capacities."

It is pointed out that much equipment is complicated in design, which adds to problems of maintenance and machine dependability, so more attention should be paid to minor details. "Too many fine pieces of machinery cause excessive trouble because a seemingly minor part does not meet requirements of the machine. For example, bushings on many machines merely are pressed into place without keys or set screws to hold them. Consequently, they turn with the shaft, and proper lubrication is impossible."

**"Too often it is necessary to go to the top man and insist on service."**

**"New designs should be based on research into the needs of foundries."**

Another point made is that new machines must be easy to operate and reduce the use of scarce manpower. Also that design and engineering should permit machines to 1) be co-ordinated and balanced with movement of materials in process to the next stage of production, 2) provide for increasing quality of product, and 3) offer greater accuracy, finer casting surface finish, closer metallurgical control and fewer defective castings.

Operators of jobbing shops want semiautomatic equipment that is adjustable to the production of a range of sizes, shapes and types of castings.

**Molding Equipment**—As much developmental work should go into molding machines for short-run jobbing work as goes into high-production machines, say foundrymen. They add that much can be done to keep sand out of bearings and machined parts to eliminate expensive repair and mainte-

**"Manufacturers should work the bugs out of their machines."**

nace work—perhaps by use of another material in place of present used boots to protect cylinders and draw slides.

Among molding machine developments wanted by foundrymen are greater flexibility to handle various size patterns and better methods for quick changing of patterns. Mold clamping should be faster for rollover and draw work. Small foundry operators want cheaper automatic molding machines.

Also, there is claimed to be a need for molding machines using air or hydraulic pressure for squeezing to provide uniform mold hardness and eliminate some of the manual labor. It was indicated that "Such machines are now on the market, but they are not versatile enough to handle various sizes of flasks."

According to a jobbing shop operator, "Seventy per cent of green sand molds in our foundry are being made on jolt-rollover machines, some of which are 25 years old. We want to replace these old units, but feel that the equipment now on the market offers few improvements over the old machines."

**Coremaking Machines**—In the field of shell coremaking one operator would like to have a blower with greater flexibility than is offered by current machines. The machine, he says, should blow complex cores into a heated box, be within the price range of the average foundryman, lend itself to quick corebox changes and be fast enough to produce cores economically.

One foundryman asks "Why doesn't some coremaking machine manufacturer devise an apparatus that will produce a shell core and drop it into a mold as it passes under the machine? Equipment manufacturers should forget ancient customs and think in terms of automatic equipment."

Suggestions for needed coreroom equipment include: Light conveyors to handle small cores; automatic timed ejectors to push cores from coreboxes; regulators to permit the proper amount of sand to be injected into the corebox; jolt machines for coreboxes, production and handling equipment for $CO_2$ cores and blowers to produce 1000 to 4000-lb cores.

**Melting and Pouring**—In melting there are daily variables to be dealt with no matter what type of equipment is used. Consequently, some foundrymen feel that development of a faster, less expensive method of melting to obtain exact, consistent analysis and hotter iron would be desirable. Equipment producers should watch closely for possibilities of applying atomic energy to foundry melting operations, one operator believes. Less costly electric melting facilities also were cited as a need of the industry.

Another foundryman would like a simple mechanism to shift weights and jackets from mold to mold. He says that devices now available do not perform satisfactorily.

"Why hasn't some manufacturer developed a practical, foolproof device for pouring molds automatically?" was asked by one operator.

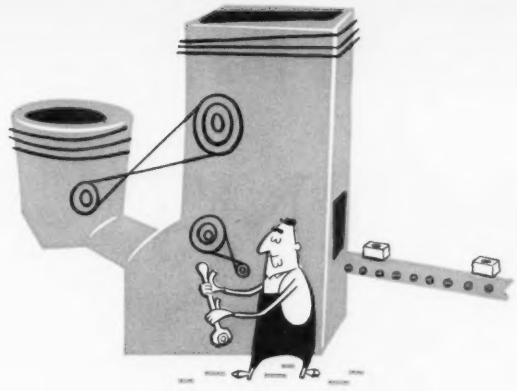
**Sand Conditioning**—Sand reclaimed by existing equipment generally is substituted for new sand in facing and core mixes. Several steel foundries, according to one operator, now are using an all-purpose sand, which roughly is shakeout sand sweetened up with reclaimed sand. Results are said to be good. He would like see semireclamation equipment developed to "half clean" shakeout sand. Better control, he believes, could be achieved over such sand than over the mixture of completely cleaned and untreated sand.

**"Original, operating and amortization costs of equipment must be lowered."**

Other developments suggested are a better classifier for use on wet reclamation systems, and higher quality gear boxes for sand mills. A user of the latter said, "We recently purchased a new sand mill and the gear box already has been out for repair more times in nine months than the gear boxes of mills we have had for 14 years."

**Shakeout and Cleaning**—Foundrymen would like to see shakeout equipment developed which would be less damaging to flasks. Also they feel that the problem of handling hot sand and metal from shakeout is not solved by present equipment.

With regard to cleaning, they say that manufacturers of arc and torch cutting equipment



**"Claims of cost savings and production are too optimistic."**

should speed development of casting cleaning equipment. The point made is that while chipping is an effective cleaning method, chipping hammer operators are hard to get and keep.

Some foundrymen suggest that an entirely new approach be taken to the snagging of castings. Electronic vibration might be used for removing metal, with the operator simply feeding work into an automatic machine, they say.

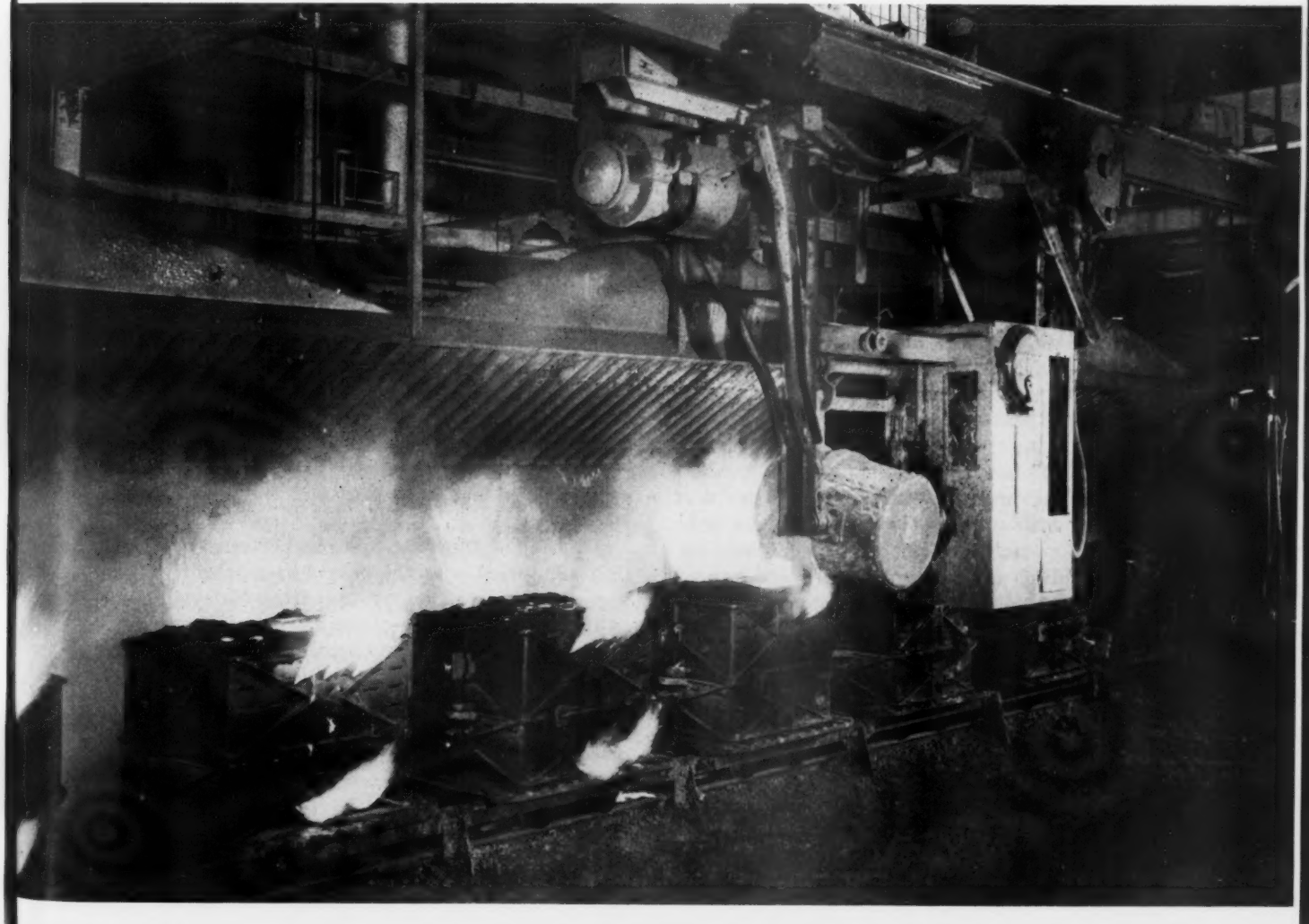
## WHAT FOUNDRYMEN WANT

**Noise, Dust and Patterns**—The problem of noise is assuming importance in the minds of foundrymen who believe that economical devices of some kind should be available to reduce the noise level in foundries. Their thinking is based not only on the fact that laws in some states make industrially caused deafness compensable, but because a man can work much more efficiently when the noise level is reduced.

They also say that dust collection equipment is rated on the number of cubic feet of air handled per minute with no relation to dust loads, and that simpler methods of testing air flow and dust loads should be devised.

Says one foundryman, "Judging from our experience in designing and buying equipment, there remains a great deal of work to be done on controls before the completely automated foundry will be a smooth-working, comparatively trouble-free actuality."

With regard to patternmaking, one craftsman believes that plastics afford great promise and progress has been achieved by their use. He feels that much remains to be done, however, before a finished pattern or corebox can be produced by making a wood master, molding it, pouring it in plastic, and shaking out the equipment ready for use.



*What Manufacturers Predict for . . .*

# EQUIPMENT and SUPPLIES

**Despite major strides in recent years, further improvement in types and quality of foundry equipment and supplies is forecast by manufacturers. Emphasis on mechanization will continue, they say**

IN SEEKING some indication of future trends in operating practices, FOUNDRY asked these questions of a representative group of equipment manufacturers and purveyors of foundry supplies and raw materials:

What do you think will be the trends in foundry equipment, supplies and raw materials during the next ten years?

Can we expect entirely new types of raw materials and supplies, or will the emphasis be placed on improvements?

Can entirely new types of machines be expected?

How far will automation of foundry operations go?

The discussion which follows is a composite of the thinking as expressed by these industry leaders.

**Changed Attitude**—The last 30 years have seen a remarkable change in attitude among foundrymen regarding use of new equipment. Resistance to new methods and processes generally has disappeared, and today's foundryman is willing to try any new process or equipment which has a labor-saving potential or which will improve quality of the product without increasing costs, it is said.

New developments in automatic molding, mechanical handling and automation have proved that production figures once projected on a per-day basis are now accomplished on a per-hour basis. But manufacturers believe that the ultimate has not yet been achieved and that it is apparent the so-called fully automatic, completely pushbutton-controlled foundry is many years away.

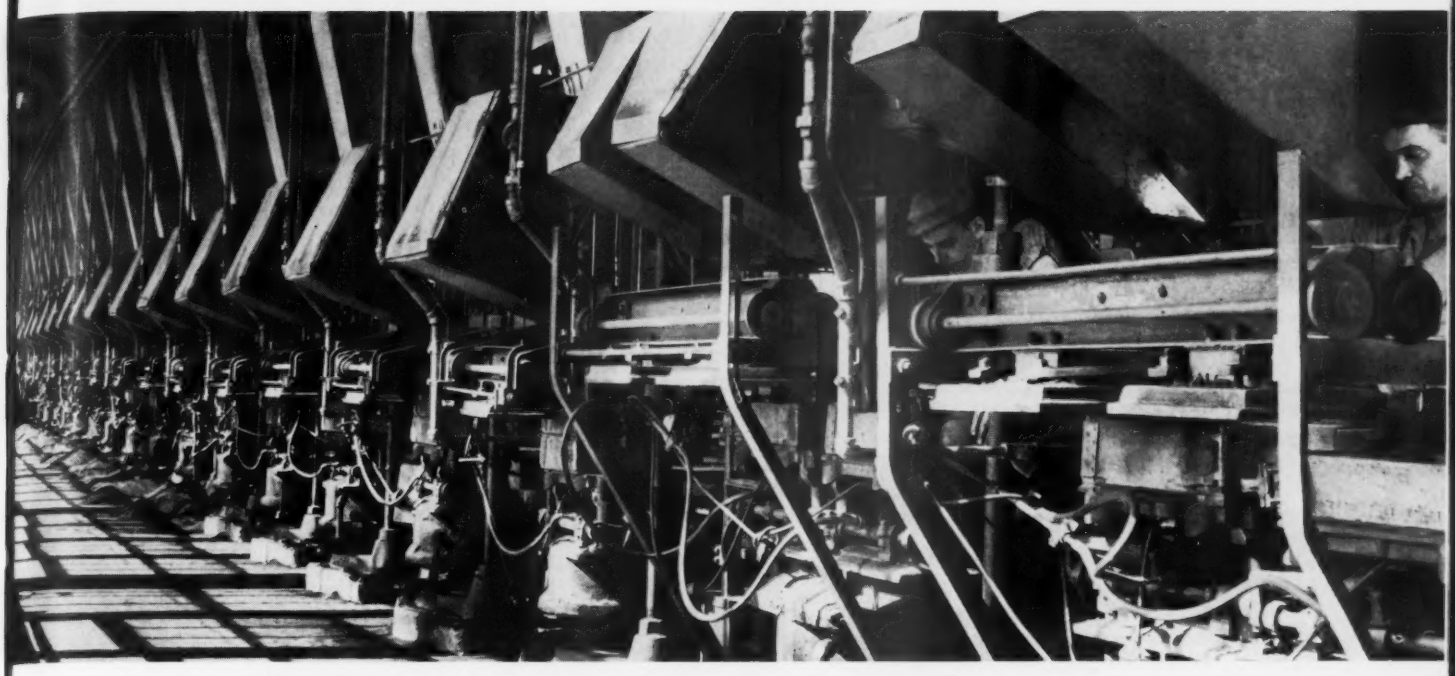
Some equipment people say that the universal desire to increase production while reducing costs has made many foundry installations obsolete—including some equipped as recently as within the last five years. This obsolescence results from production limitations rather than because the equipment is worn out or mechanically unsound.

**Only a Start**—To several manufacturers, it appears that development of methods for the handling of materials from one operation to another is in its infancy. Today, automatic molding and coremaking machines are available that will produce at fantastic rates. Much engineering and pioneering work is yet to be done on servicing equipment associated with these automatic units. The automatic making of a core or a mold is only one step in the total handling of the product. Sand, metal, flasks, cores, castings, raw materials and refuse all must be moved at a speed and in a manner to fully realize the rated capacities of the automatic units.

It is felt that a distinct challenge to suppliers of material handling equipment lies ahead to provide the accessory units properly sized and constructed to meet the severe and frequent service required in handling the greatly increased productivity of automatic machines. The challenge will be met within the next ten years and the changes required are not now presently employed in designs.

**A Period of Digestion**—Several executives believe that equipment-wise the next decade might well be a period of digestion by foundries in leveling-out and evaluating the tremendous variety of new metals, processes and equipment being developed to meet the needs of new methods. There will be a necessary continuing perfection of present-day equipment but probably no radically new and completely different machines from those operating today, unless new processes appear that require completely new concepts.

**Tomorrow's Foundry**—If present trends continue, the foundry of the future should take on an appearance unlike today's foundry both internally



Battery of molding machines served by overhead sand hoppers. This installation is at the Chicago Works brass foundry of the Crane Co.

and externally. Visible emissions from melting and pouring operations—both ferrous and nonferrous—will be eliminated or greatly reduced by increased use of soundly engineered supply and exhaust ventilation. Better illumination will make the foundry lighter and brighter. Improved control methods will keep noises below harmful levels. Dust will be trapped at its many sources to keep the atmosphere clean. Complete safety devices will be designed into original equipment.

Melting equipment makers believe that basic melting for metallurgical control and use of less expensive raw materials should result in changes in cupola design. For output of 200 tons or more per day, a projected future cupola will have external water cooling without refractories in the melting zone and water-cooled protruding tuyeres. In large-tonnage operations of 500 tons per day the future cupola will look like a blast furnace and will incorporate continuous operation.

**Specialized Equipment**—A trend is shaping up for the building of special or single-purpose machines to give maximum rate production on a limited number of jobs, according to some manufacturers. Increased speed is attained by reducing the flexibility and versatility of the machine. Perhaps the answer to automation for some jobbing foundries, it is suggested, is to select a reasonable range of work, mechanize and rig for the most efficient operation and then accept orders only for this type of work. Some foundries already are doing this but have run into difficulty when they expect equipment to handle too wide a range of work.

There is evidence that the era of the molder-pourer is vanishing. In the future, pouring crews will pour and molders will mold. Automatic pouring by remote control will eventually come into being, it is predicted. Conveyor pouring whereby several sprues can be poured from several ladles simultaneously by one operator will become a reality.

**Trend in Melting**—Advantages of electricity over fuel will continue to be significant and there will be a trend toward electric melting, it is predicted. Larger furnaces will be required but complete flexibility will be the rule. Vacuum melting furnaces will be improved and made larger. Needs will develop for both vacuum arc and vacuum induction furnaces. Vacuum arc furnaces are seen as more or less entirely automatic and will use consumable electrodes. Vacuum metal from either source may be shotted for inert gas melting in automatic casting operations for the high-temperature alloys.

Continuous casting operations already in large production for nonferrous work will spread to ferrous work. Centrifugal casting will be improved and widened in scope with the aim of becoming completely automatic.

In line with increased use of automatic and mechanized equipment some executives see a need for development of good designs for castings to make them easier and cheaper to cast. Good design and good standards of acceptable quality will increase the total market for castings both in quality and in increased percentage of components being cast. Increased volume makes mechanization easier as higher volumes of identical parts are simpler to handle mechanically.

Simplified shapes also lend themselves readily to mechanized inspection methods. Efforts to arrive at inspection standards that are realistic, less rigorous and easier to meet will lead to a reduction of inspection time and cost of repair work since only serious defects need be repaired.

**Automatic Inspection**—Methods of automatically

## What Industry Leaders Say

**How Far Automation?**—"The limit of automation on foundry operations will be reached when wages paid to the skilled maintenance technicians required to keep equipment 'downtime' to a satisfactory minimum equals the wages of the semiskilled or nonskilled machine operators or helpers who would have been required had automation not been employed."

**Using What You Have**—"There is room for equipment which will enable the foundryman to reduce his costs and improve his product, to do a better job with what he has by using the best of already proved techniques."

**Slow To Change**—"Equipment designs capable of better mechanization of foundry operations would be developed much faster if the foundrymen were less reluctant to change methods within good foundry practice to accept them."

**More Than a Machine**—"Installation of a mechanized or automatic molding unit by itself will accomplish nothing. Practices, methods and servicing equipment must be changed to get optimum results."

viewing indications of defects are now said to be in advanced stages of development. These methods will reduce the need for manpower to view the general run of castings, and only those castings with defects will be set aside for visual inspection and salvage. As casting shapes are simplified to better carry stresses, automatic inspection will be further simplified and co-ordinated into the projected automatic and mechanized production processes.

**A Limit to Mechanization?**—Sentiment is shared by nearly everyone that the foundry industry is already moving into a future of mechanized and automated operations. There are differences of opinion on the degree of automation that can be established in an industry that deals with a variable product. Predictions range from conservative use of automated procedures (even in large production shops) to the completely automatic pushbutton foundry. The next ten years, it is believed, will undoubtedly see progress to something between these predictions.

Some persons maintain that semiautomation more nearly approaches reality. This setup would involve automated processes segmented in parallel rather than in series, thereby preventing total loss of production during breakdowns—as would occur with in-line automation. Others believe that large production foundries will become completely mechanized and automatic, with universal use of automatic controls. The great part of this mechanization will be confined to material handling operations since a tremendous potential for savings and elimination of hard work lie in that direction.

There also is thinking that the answer for jobbing shops is to move toward unit automation and for production shops to move to plant-wide automation. In any event, the quality and quantity of the machine product will depend on equipment performance rather than on manpower. This will place an increased burden on management in providing technical personnel in the maintenance departments. Management's problem will be to keep the automatic equipment functioning at maximum efficiency, as a large part of the sales dollar will depend on equipment performance alone.

Automation as it is now practiced has its greatest success in operations where it can eliminate manual effort, heat, dirt, monotony or accident hazards and where a machine can be depended upon to perform operations with greater speed an accuracy than a man can.

It is pointed out, however, that in performing these operations automatically, a point of diminishing return is reached where the cost of technical help and the number of men required to maintain operations approach direct labor saving. The reaching of this equilibrium may well be the determining factor as to how far foundry automation can and will go.

# Materials and Supplies

Trends in materials and supplies in the next decade appear to be equally divided between development of new ones and improvements in those already available. This is the belief of material and supply people, who cite two factors to support this viewpoint. One is the change in knowledge and conceptions within the industry itself, due to increasing employment of engineers, technologists and others familiar not only with the foundry industry but also with other industries.

The second factor is the discovery by other industries, such as the chemical industry, that the foundry offers a good potential market for some of their products—resins, ethyl silicate, sodium silicate, carbon dioxide, etc.

**The New Aids the Old**—Introduction of such new materials, supplies or practices usually leads to improvements in those already in use. It is pointed out that impact of shell molding on the green sand process has led to intensive studies of sands, additives, binders and molding procedures with a view of making green sand more competitive. Further, that the tendency toward higher compaction of molds in the green or moist state to produce castings with closer dimensional tolerances and smoother finishes already has indicated that at high pressures, binders which require water to develop plasticity and adhesiveness cannot be used since the water is squeezed out on the pattern. Organic materials are said to eliminate that difficulty, and the search goes on for new, preferably low-cost, compounds.

Nonferrous ingots will be made in the future under closer control, manufacturers predict

Activity in the relatively new $CO_2$ process undoubtedly will result in development of new or improved binders which will produce molds and cores quickly, it is believed. One suggested possibility is oils which polymerize rapidly at elevated temperature. Blown into heated boxes, they harden sufficiently to permit removal and handling, and continue to polymerize to the final state while exposed to the atmosphere.

**Substitutes for Silica**—Another trend referred to is the attention being given to substitutes for silica sand, as evidenced by increasing application of zircon sand and work on olivine. Chamotte and powdered glass are being used. Studies are being made on use of crushed coke and graphite screened and sized to meet specific requirements. One possible newcomer mentioned is a ceramic called stupalith—a lithium aluminosilicate. Processed to develop beta-spudomene, it has the unique property of contracting when heated and expanding when cooled—quite contrary to our usual concepts of thermal properties. Increasing tendency toward a more theoretical approach to molding problems by engineers and technologists utilizing thermal conductivity, heat capacity, and other studies undoubtedly will bring forth new concepts, some suppliers say.

Progressive suppliers understanding foundry problems indicate that they tackle them through specialized personnel and experience. They constantly appraise future needs of the industry and endeavor to plan research in harmony with advanced thinking and in step with technological advances. Often when something new is developed, considerable difficulty is experienced in introducing it into the foundry because it involves changing old established practices and methods. Suggested solutions are a laboratory established by the supplier or a recognized independent experimental foundry for evaluating various developments and translating them into production practices.

**Raw Materials Improved**—In the raw material field it is said that pig iron, a crude raw material, has been improved considerably in recent years through closer control of raw materials and operations. As evidence of this improvement, pig iron used for making nodular iron—a product sensitive to certain subversive elements—are mentioned.

In the last year and a half about 40,000 tons of pig iron and steel are reported to have been treated with calcium carbide to reduce sulphur content. Results indicate about 8 lb of carbide per ton of iron will reduce the sulphur content about 50 per cent, and greatest efficiency is obtained when the original sulphur is over 0.003 per cent.

Studies are continuing in the foundry of injection procedures for improving gray iron by sulphur reduction and control of carbon content and structure. These practices, it is felt, will permit production of castings from one base iron "tailor-made" to meet a variety of applications. A new agent suggested for producing white-fracture iron is calcium cyanamid, which functions through introduction of sufficient nitrogen to prevent graphitization. In the nodular iron field, new agents and procedures are reported being developed to simplify production. In cupola melting, attention is being given to further improvements in quality of coke. Basically, these studies are said to involve changes in reactivity and solution characteristics to promote better metal-to-coke ratios and more accurate carbon control.

**Better Control of Metals**—Nonferrous ingots will be made under more closely controlled conditions based on a better understanding of alloying procedures, necessity of close control of composition, and effect of very small amounts of various elements, suppliers predict. To that end many producers have installed equipment for rapidly determining the various chemical elements during the production of ingots.

Undoubtedly, as knowledge of effect of gases and elements on ferrous and nonferrous alloys increases, one can expect expanding use of prepouring treatments and development of new agents for the purpose, it is believed. Present materials include numerous metallic elements and compounds, fluorides, certain gases, dry air, etc.

**Up to the User**—While one producer believes there is room for improvement in metal abrasives, he feels that how fast this betterment is attained and the extent will depend on the consumer. It is claimed that more progress has been made in abrasives the last ten years than in the preceding fifty, but that the foundry industry as a whole has not taken advantage of these improvements. Failure to do so is said to result from 1) lack of operating know-how, 2) poor maintenance of blasting equipment, and 3) admittedly inadequate costing procedures. This supplier strongly recommends that equipment manufacturers educate the customer by frequent check-backs as to the long-run costliness of improper operating procedures and poor maintenance, so that the equipment's performance will sell itself when it is time for replacement or expansion.

# Statistical Controls

## —A Valuable Tool for Reducing Costs

*Here is a description of a simple and practical method of controlling foundry variables. A working knowledge of the fundamentals of a statistical control system can be acquired in a two-day coaching period*

By KENNETH M. SMITH
*Foundry Consultant*

FEW foundry executives will deny that there has been an urgent need for a practical method of controlling foundry variables. Why, then, has our industry been slower than most to adopt statistical controls? The answer involves foundry tradition, a common belief that the foundry is different, a natural distaste for paper work, and widespread ignorance of the method, its simplicity and the economics of its use.

It is the purpose of this article to correct false concepts and to help remove the veil of complexity which tends to surround the subject. To accomplish this purpose we must be able to show a simple and practical method for all foundries to profit by adding the statistical tool to their quality control programs.

**Why We Need It**—For centuries, foundrymen have tried their best to control the quality of their product. Many still believe that the recent surge in technical know-how will eventually solve the problem of control. While it is true that technical knowledge can produce an individual quality casting, there is a vast difference between the type of know-how required for one casting and that necessary for an effective job in quality control. Not until we attempt to control quality on the over-all basis do we really come up against the problem of variables; then we know that, by itself, technical ability is insufficient. To a large extent, quality control is a matter of holding within economic limits the variations which men, materials and equipment cause to occur in the process. To succeed, we must have some way to measure and correlate the variations before we can hope to control them.

Statistical controls are based on laws developed from studies of the fundamental nature of variation. As we become familiar with these laws and apply them, we can only conclude that we have been poorly equipped in our previous efforts to control quality and we are left with a feeling of amazement that those efforts have brought us so far. To take full advantage of this technical and statistical know-how, and to establish quality control as a major foundry function, we should set it up with responsibility to top management and, through proper co-ordination, integrate it with the line functions of the foundry.

**What They Are**—To the uninitiated, statistical controls often appear to be somewhat complicated. Actually, foundrymen have acquired a working knowledge of the fundamentals within a coaching period of two days. Perhaps the simplest way to describe statistical controls is to compare them with the older type controls still being used in most foundries. As a background, we should review the part that controls play in the over-all picture. In this connection we will consider quality control as a function made up of two main divisions or phases.

The first phase of quality control consists of collecting and measuring various types of data concerning quality characteristics from which controls and control limits are set up and the quality problems are brought into focus. Regardless of whether the controls established in the first phase are the older type or the statistical type, the second phase consists of taking action based on the conclusions of phase I and is a separate function carried out by the technical and supervisory personnel.

It is important to remember that the success attained in phase II depends upon the accuracy and the effectiveness of the controls established in phase I. In judging the merits of statistical controls versus the older type, the whole case rests on the ability of each type to provide the proper basis for action.

**Older Type Controls**—Long before quality control became an organized function, some consideration was given to a method for controlling the values of quality characteristics. The common

practice still is to permit the specifications of engineers and customers to serve as control limits for casting dimensions and metal properties and to set control limits over the process itself by experiment and judgment. The basis for the latter group is the accumulation of data covering such items as sand properties, metal composition and defective castings. In foundries where these controls are most effective, the quality level is established by computing the average of such items as silicon content, spout temperatures, sand permeability and scrap percentages. The control limits are then set an equal amount above and below the average.

The sole purpose of the older type control limits is to take appropriate action when values of the various quality characteristics exceed the limits. In practice, however, when out-of-control values show up, the action step is not always carried out, the reasons for which will be brought out

**Statistical Controls**—In this article we are attempting to sell foundry executives on the merits of a method rather than on the details of its use, so the description will stress only the essential points. The accumulation of data for setting up statistical controls is much the same as in the older method. The main difference is that statistical controls employ a scientific method of taking samples and reporting data. The averages are figured from the data and become the focal point for computing the statistical control limits. Here the similarity ends. Neither judgment nor specification are used to determine the position of the limits. Statistical limits are the dividing line between normal and abnormal variation and are based on the frequency distribution pattern formed by the values which indicate normal performance or a state of statistical control. Since the laws and formulas used to set the control limits are derived from the normal frequency distribution, an understanding of that phenomenon is important to properly appreciate statistical controls.

Fig. 1 illustrates a hypothetical example of how foundry scrap figures would appear graphically, if the daily percentages were to vary normally. The data shown in Table I were compiled from previous records. These figures represent the daily scrap percentages, by pieces, for 100 days' production of 1000 castings per day. The daily fluctuations above and below the 5 per cent average of the data in Table I tend to form the normal frequency pattern shown in Fig. 1—provided the causes for scrap remain constant, day after day.

The dotted lines separate the daily scrap percentages into three equal divisions called standard deviations (symbol $\sigma$) above and below the average. The top and bottom dotted lines are the 3 $\sigma$ statistical control limits, within which are contained the normal or chance values of variation and outside of which occur all abnormal or cause values worth identifying. Because we are studying the normal frequency distribution, all of the values for the 100 days are within the 3 $\sigma$ limits, which are set by formula at a high of 7.07 per cent and a low of 2.93 per cent.

Frequencies are formed by counting the days within each standard deviation (between each pair of dotted lines) and the picture becomes clear in the diagrams at the right of the horizontal graph. First a histogram or bar chart is constructed to measure the frequency of the scrap percentages which fall in each standard deviation. Formulas are then applied to the frequencies of the histogram to complete the curved diagram, which must cover the same area as the histogram. When the frequencies are normal, the curve always comes out the shape of the one shown and is known as the normal curve, a fact which allows us to compare any frequency distribution with the normal.

We have now established the normal variation for a 5.0 per cent average scrap and a daily production of 1000 castings and find that out of 100-days' production and under normal conditions we could expect to have all days within the 3 $\sigma$ limits which in this case means between 2.93 per cent scrap and 7.07 per cent scrap. The normal frequency distribution between these limits would give us 68 days between 4.31 per cent and 5.69

**TABLE I—Percentage of Scrap Castings During 100-Day Period**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1—4.07 | 11—5.21 | 21—5.09 | 31—5.37 | 41—4.45 | 51—5.38 | 61—5.23 | 71—5.63 | 81—5.45 | 91—3.41 |
| 2—4.59 | 12—5.62 | 22—4.82 | 32—4.95 | 42—4.02 | 52—4.50 | 62—5.29 | 72—4.38 | 82—4.86 | 92—5.65 |
| 3—6.50 | 13—4.32 | 23—6.01 | 33—4.37 | 43—3.14 | 53—4.84 | 63—5.36 | 73—6.12 | 83—3.80 | 93—6.11 |
| 4—4.87 | 14—5.35 | 24—5.48 | 34—6.34 | 44—4.98 | 54—4.67 | 64—5.52 | 74—3.96 | 84—6.95 | 94—4.60 |
| 5—3.99 | 15—5.75 | 25—4.63 | 35—5.18 | 45—5.25 | 55—4.69 | 65—5.55 | 75—4.81 | 85—4.60 | 95—4.31 |
| 6—5.35 | 16—5.53 | 26—3.81 | 36—5.32 | 46—5.95 | 56—4.92 | 66—5.39 | 76—5.20 | 86—6.10 | 96—5.44 |
| 7—5.04 | 17—6.36 | 27—6.27 | 37—3.80 | 47—3.94 | 57—4.69 | 67—5.32 | 77—5.05 | 87—4.83 | 97—4.41 |
| 8—3.65 | 18—5.50 | 28—4.91 | 38—4.93 | 48—4.85 | 58—4.12 | 68—4.43 | 78—5.56 | 88—4.40 | 98—5.72 |
| 9—5.83 | 19—5.33 | 29—5.49 | 39—6.26 | 49—5.47 | 59—5.02 | 69—4.14 | 79—4.38 | 89—4.86 | 99—3.80 |
| 10—4.88 | 20—4.25 | 30—5.02 | 40—5.09 | 50—4.42 | 60—5.93 | 70—4.46 | 80—5.74 | 90—4.19 | 100—4.87 |

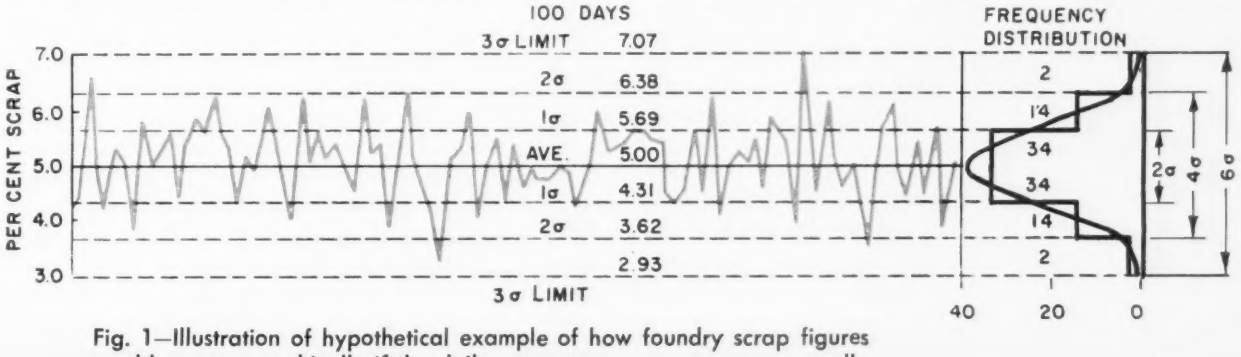



Fig. 1—Illustration of hypothetical example of how foundry scrap figures would appear graphically if the daily percentages were to vary normally

per cent, 14 days from 3.62-4.31 per cent, 14 days from 5.69-6.38 per cent, 2 days from 2.93-3.62 per cent, and 2 days from 6.38-7.07 per cent. The figures presented are accurate only to the nearest full day, but for all practical purposes we have shown a true picture of normal variation in a foundry quality characteristic. The same principles of normality are applied to setting up limits for such variables as carbon content, etc.

At this point it is logical to question some of the aspects of the so-called normal pattern of variation. How do we know that we have charted normal variation when in practice we rarely if ever find a frequency distribution which exactly matches the normal curve? Of what practical use is this knowledge of the normal variation, even if we do accept the picture as presented?

In answer, statisticians have reached their conclusions after countless observations in industry and the professions. Their findings are that when the conditions affecting a given quality characteristic remain constant, when the average is taken from typical data, and when a sufficient number of observations are taken (probably many more than 100), the resulting frequency will closely approximate, on a percentage basis, the one they call normal. This simply means that 99.7 per cent of the values should be within 3 $\sigma$ limits, 95.5 per cent within two standard deviations of the average, and 67.2 per cent within one standard deviation of the average. These are approximately the figures we formed in our own example.

Knowledge of the normal frequency distribution certainly helps us to understand statistical controls, but in foundry practice we more or less forget about frequency distributions and concentrate on the average and the control limits. When an observation falls outside the control limits, we know it signifies an abnormal variation that did not occur by chance and that we can find the reason for it 997 times out of 1000.

Of equal importance is the fact that when all the values fall within the control limits, we know we have reached both a state of control and the economic limits of the process as is. Under these conditions, if the average is still considered to be too high or too low, the process itself must be changed, not the variations in it. The net result of using statistical controls is the opportunity to take immediate, decisive and intelligent action on quality problems.

**A True Basis for Action**—The case of statistical controls versus the older type controls is being judged here on the basis of effectiveness only. In fairness to the older type we must agree that they accomplished much in the pioneer days of quality control. Today they must be replaced because of what they do not accomplish.

When control limits are set either by specification or by judgment there is no proof that 1) the process is capable of staying within the limits, 2) that all values which fall outside the limits actually denote lack of control, and 3) that all values which fall within the limits are being controlled as closely as economically desirable. The net result of these three unknowns is that no clear-cut action can be taken on an immediate basis for fear of placing the blame in the wrong place. The tendency is to delay action on quality problems until after a trial-and-error period, which often means that corrections are made after excessive damage has been done.

**Applications**—In any foundry there are so many opportunities to apply statistical controls that to take advantage of all of them would add up to a program that would be complex in character, cumbersome to operate and costly to maintain. A few guiding principles help to avoid both oversimplification and overindulgence.

In large captive foundries where the patterns are few and the work repetitive, it often pays to establish controls over many of the individual patterns, the individual workers, and to cover most of the process variables. Such extensive treatment would not be feasible in jobbing and small foundries where the emphasis must be on controlling types of work, groups of workers, and on simplifying the control system. Just how far we can advantageously adopt the simplified approach is a moot question, worthy of consideration. It seems appropriate, therefore, to describe briefly a statistical control program introduced by the author and received with favor by both large and small foundries. Designed primarily for use in jobbing foundries, the method permits simple but effective control despite the handicaps of numerous patterns, short runs and diverse operations.

**A Simplified System**—The all-important nerve center of this system is a group of P charts, each of which records and evaluates the daily percentage of a particular casting defect such as slag, sand inclusion, etc. Each type of work (squeezer, rollover, etc.) must have a separate group of defect charts. Only the most important defects are included in each group because experience teaches that five to ten types defects are responsible for 75 to 90 per cent of all scrap and that it does not pay to control all types.

The casting defect charts show up abnormal conditions only after castings are produced, so the success of the system depends upon what action can be taken to avoid defects in future castings. In practice, the basis for action is clear and true, partly because all patterns of one type of work are subjected to the same process, partly because on days when a defect shows lack of control the offending pattern, worker or phase of the process is easily identified, and partly because the average and control limits measure the capability of the existing process to avoid each defect.

This method operates quite effectively without setting up statistical controls over the process variables. For maximum results a few of the latter type controls may be placed in effect but only when and where the defect control charts prove the need. To further simplify the system, the author considered short cuts for making up the P charts. His decimal point graph in conjunction

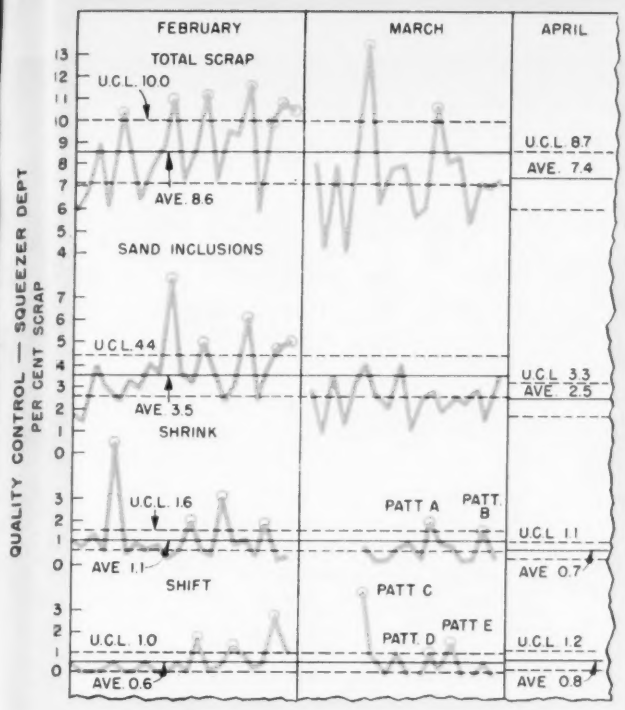



**Fig. 2—A portion of group of charts which record and evaluate daily percentages of casting defects**

with a purchased statistical quality control slide rule facilitates the computations for control limits to the point where all the chart work, in a foundry making several types of castings, can be handled on a part-time basis by one clerk. Chart interpretation and corrective action should only be undertaken by someone possessing technical know-how and familiarity with statistical method.

In preparing to start the system the only requirements are to have the casting defects properly identified and to maintain daily scrap records which show, for each type of work, the total pieces made and the number of defective pieces for each defect under control. As soon as practicable the daily scrap figures are turned over to the statistical clerk who changes them into percentages and posts them on the charts. Fig. 2 shows a portion of the group of defect P charts in effect on a squeezer operation. On these charts we are interested in two things—the averages and the points above the upper control limits.

The preliminary data section for each defect is a one-time chart (February in this example) made up from past scrap records, usually from those of the month immediately preceding the first control period. Not used for control purposes, preliminary data establish the averages and control limits for the first control period and at the same time provides a preview of the problems to be solved.

From the preliminary data in Fig. 2 we see an average total scrap during February of 8.6 per cent by pieces. Total scrap was above the upper control limit (UCL) on 7 days out of 21. Sand inclusions were responsible for an average scrap of 3.5 per cent (41 per cent of total scrap) and contributed heavily to lack of control in total scrap (five days out of the seven). Shrink was responsible for total scrap being out of control on one day.

Most important is the evidence that existing methods will permit a daily average of 3 per cent scrap from sand inclusions, even when control is perfect (all days within control limits). An investigation was in order and disclosed that almost all of the molders were leaving loose sand in sprue basins and at the bottom of sprues. Each molder received instructions on mold cleanliness, and the first control period was started the following day on sand inclusions and one week later on the other defects. During March all out-of-control points were followed through and corrections made.

Toward the end of the first period it was decided that a snap flask check program was needed to control shifts properly and was placed in effect. April averages and control limits are computed from the March performance, reflecting the progress made during the first period. One sheet of cross-section paper should cover all the defects in one type of work for a period of three months.

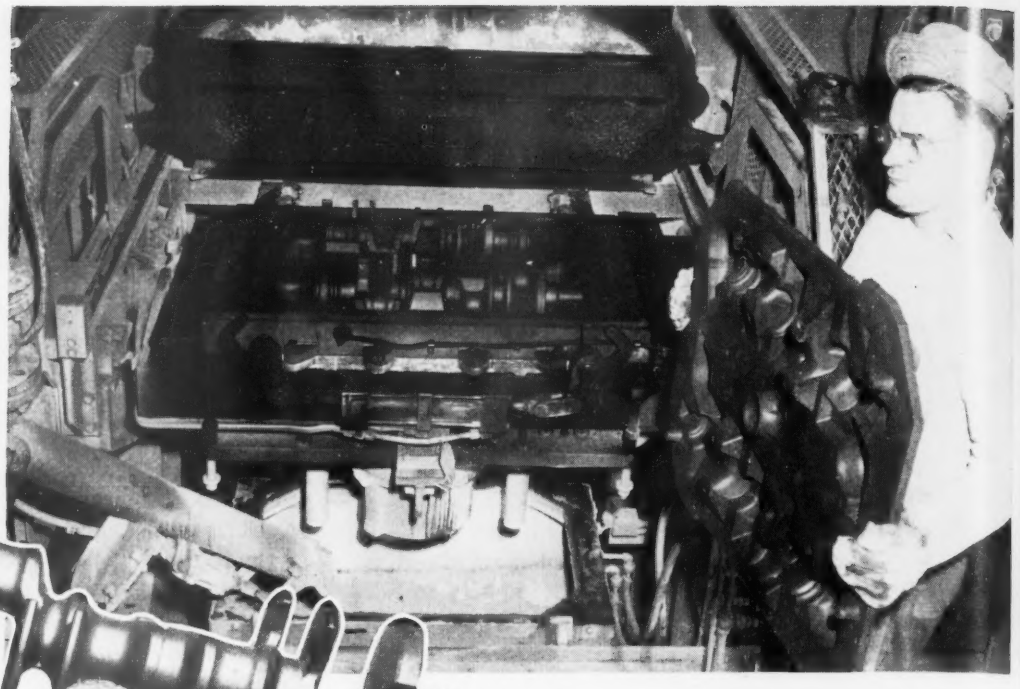
**Benefits**—Foundry executives have ample reason to be wary of all prospects to improve quality and reduce scrap because considerable money has been lost trying to solve quality problems. Numerous foundries have good materials lying idle after having been blamed for excessive scrap. The material may not have been used properly, it may not have been suited to the particular application, or it may have had nothing to do with the increased scrap, but the facts are difficult to ascertain. Many have had a similar experience when trying out new methods or a change in sand, metal or casting properties. Often the underlying cause for such errors in quality control work is insufficient or misleading information about the problems to be solved.

In a small foundry the annual loss for each per cent of scrap may be nominal while in a larger foundry it may exceed $50,000. In any foundry this money must be considered a direct loss, year after year, until the cost of further scrap reduction exceeds the savings therefrom.

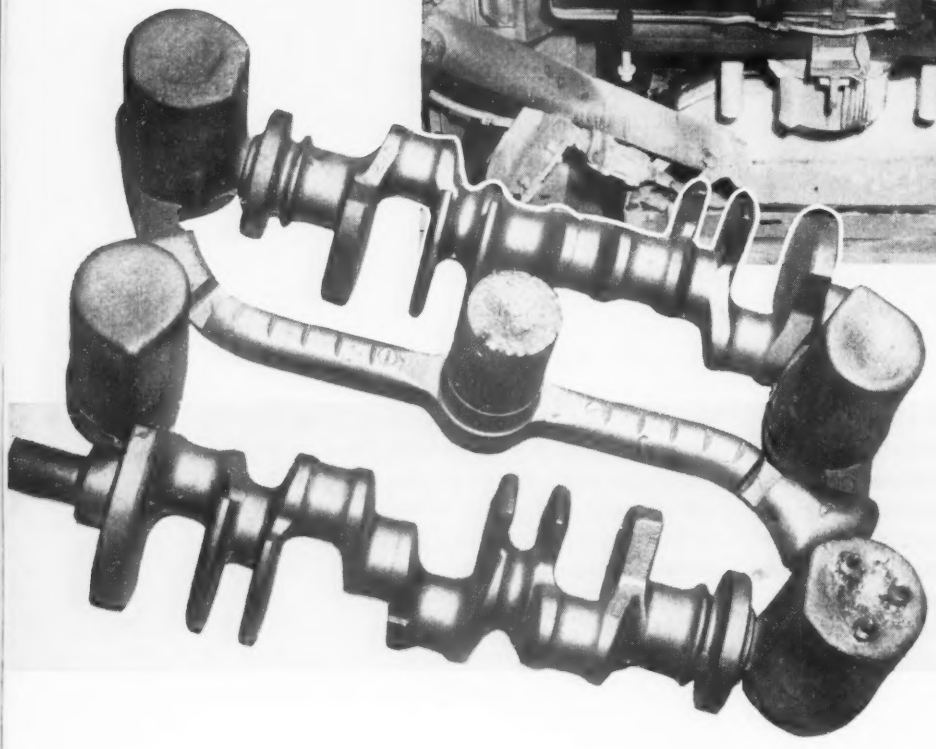
In addition to the obvious benefits from scrap reduction, statistical controls serve other useful purposes. Before statistical controls were introduced in one foundry, the superintendent and all the foremen spent one hour each morning in a scrap clinic. Later, while the scrap was being reduced, most of this time was saved for other tasks, simply because the statistical controls were able to separate the few abnormal conditions from those which could not be helped without changing the process.

One of the benefits of the simplified control system is its ability to operate in a small way. It can be used to control one defect or one type of work and then gradually expanded to over-all control. Finally, who can calcuate the additional value of a system which rapidly detects the presence of a job which does not fit the process, thereby quietly solving a problem which has long been a source of disagreement between manufacture and sales?

By ROBERT H. HERRMANN
*Associate Editor*



Operator removes drag mold half from automatic dump box machine



# Casting

*Highly mechanized shell molding line features several devices which convert many manual handling jobs into automatic transfer operations*

SHELL MOLDING is a young foundry method not bound too tightly by generations of prejudiced experience. It is blossoming in the current era of optimism, progress and head-over-heels production. It's a young man's method, full of young ideas.

The shell molding operation at Central Foundry Division, General Motors Corp., Danville, Ill. is an outstanding example of this new trend in castings production. Run by what many old timers might call a group of youngsters, line 8 at the Danville plant produces 2400 Pontiac crankshafts in a two-shift day. The foundry has seven other lines producing gray and malleable iron automotive parts in green sand.

Average age of supervisory level personnel for the entire plant is 34 years. The superintendent of work standards and methods engineering—the man responsible for co-ordinating how-to-do-it when it comes to motion path and materials handling—is a 28-year-old. Along with some of his co-workers he shares a common lack of knowledge that something can't be done, so he goes ahead and does it. He seldom wants for ideas because everyone, it seems, has no hesitation about offering suggestions for improving an operation.

Responsible for this free rein to progress is R. Verne Righter, plant manager, who points the way and turns his boys loose. There is one governing factor, however. They must be right most of the time. The result is that the plant fairly sizzles with innovations. They are noticeable particularly on the shell mold line, which was started from scratch and got into production in June, 1955.

**Pour Pearlitic Malleable**—All production on the shell molding line is in ArmaSteel (Central Foundry Division's trade name for pearlitic malleable) crankshafts weighing 64 lb. They are poured two up in shell molds measuring 24 x 36 in. Cope thick-

Template set over cope on clamping machine prevents pasting resin from entering mold cavities

An air cylinder pushes finished mold from set-off rails onto an indexing, transfer conveyor

# Crankshafts in Shell Molds

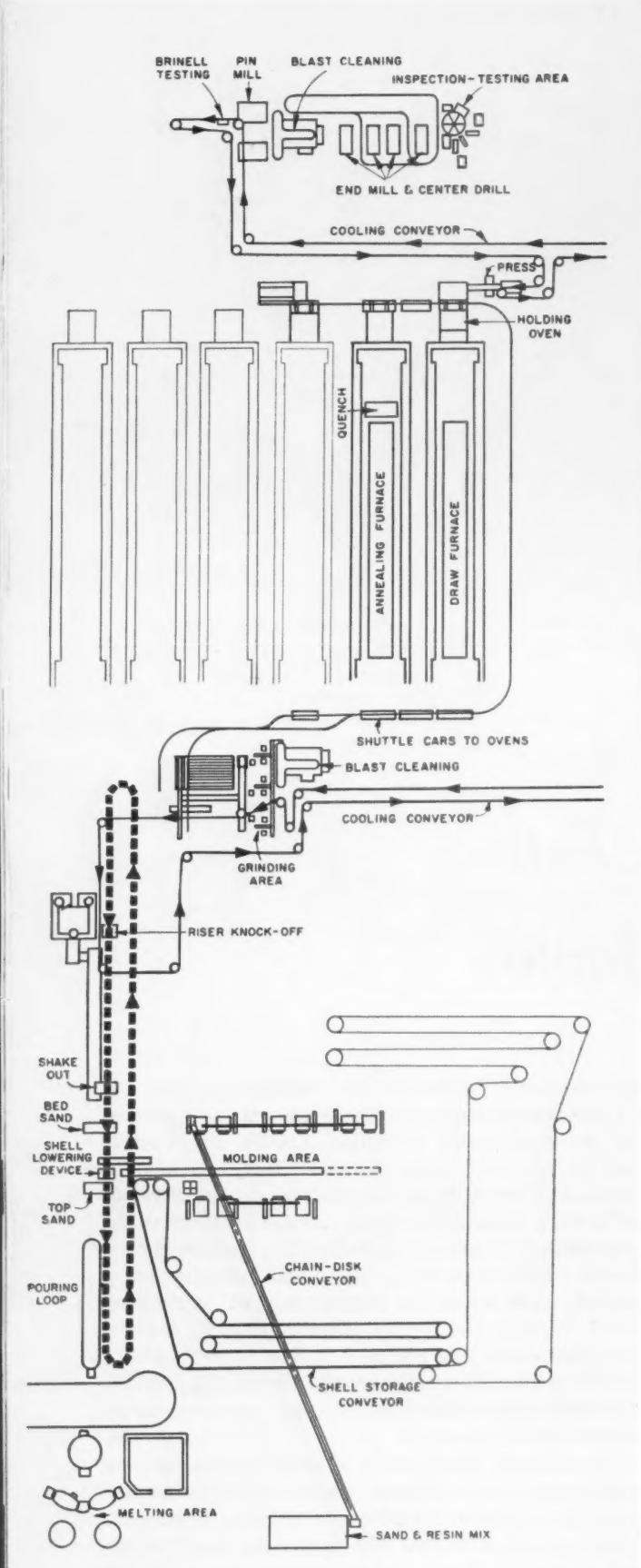
ness is 9/16 to 19/32-in.; the drag is 19/32 to 5/8-in. The empty mold weighs 88 lb. It receives 284 lb of metal, 128 lb of which is in the cranks and 156 lb in gates and risers.

Sand for the shells is delivered in drop-bottom cars, which are positioned for discharge over a grated floor opening. Sand falls through a chute to a bucket elevator and is raised to a belt conveyor from which it is hand-plowed into six bins of 8050 tons capacity and one of 525 tons capacity. Lake sand of 63-74 AFS fineness is stored in the larger bins, and 103-110 AFS fineness Vassar sand is directed to the small bin.

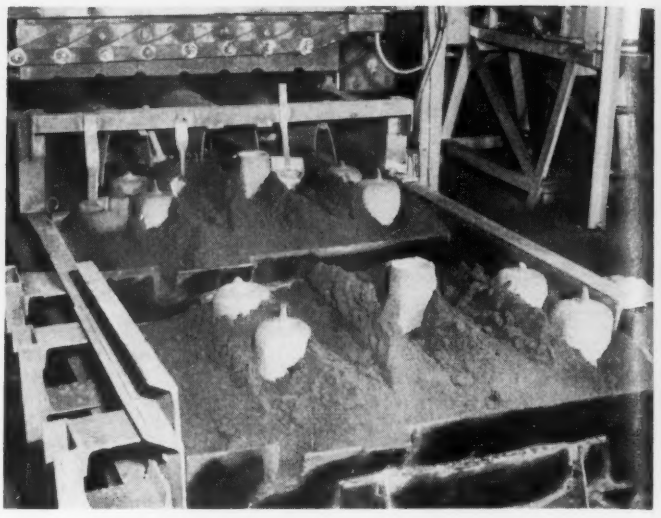
Hand-operated gates at the bottoms of the bins release sand to a 24-in. belt conveyor, feeding a bucket elevator. Near ceiling level the sand is discharged to a second belt, which feeds two cross belts, one supplying the gray iron foundry and the other the malleable shop. Pneumatic plows over three bins at the shell sand mulling area remove the sand. The bins hold lake sand, Vassar sand and dry resin. A vacuum pipe system raises resin from drums at floor level to its storage bin.

**Sand Mix Formulation**—Sand and resin are fed by vibrating feeders at the bottoms of each bin to two weigh hoppers. These hoppers are located on an electrically propelled shuttle car operating on rails just under the bins. Weighing is automatically governed by an electric eye in the face of a scale dial. Light from a bulb in front of the eye closes the circuit, actuating the feeders. Screen arms which turn with the scale indicator cover up the hole when the correct weight is reached, thus breaking the circuit and stopping the feeders. The two sands are weighed in one hopper and the resin in the other. When the weigh hoppers are positioned over the muller, they are emptied by bottom drop gates.

A batch is mixed every 8 minutes and released from the muller through an air cylinder-operated gate to a tubular conveyor in which a chain with disks attached moves the material. Sand is elevated in this conveyor to a hopper from which it is moved by a second, similar conveyor to two of the five hoppers over the five sets of shell molding machines. Operation of the vertical conveyor is controlled by a level determinator in the storage bin. Similar devices in the two molding machine




The crankshaft operation reaches across entire plant to achieve straight-line production flow



Pendulum scrapers remove surplus topping sand employed to control cooling rate of the casting

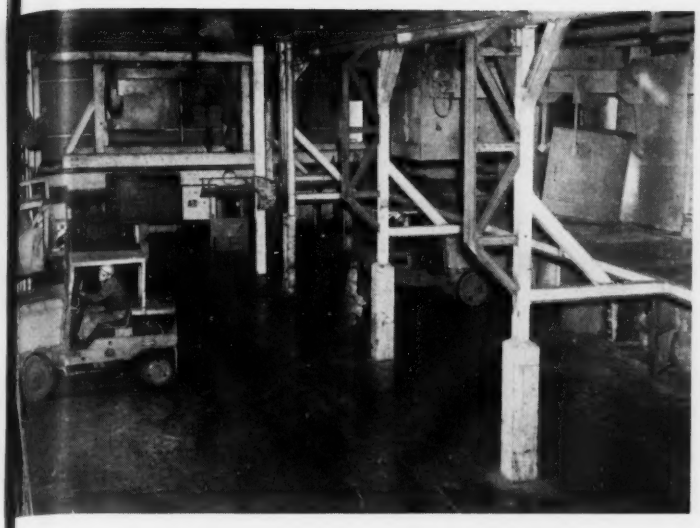
supply hoppers control the second conveyor. Two additional conveyors, one through each of the receiving machine hoppers, supply sand to the remaining three hoppers serving the molding machines. Movement of these conveyors also is controlled by level determinators in each of the bins.

One of these hoppers supplies sand to each two shellmaking machines. Sand flows from the hoppers down a 6-in. pipe, through a Y joint to two, 4-in. pipes pivoted so that they may be swung over and away from the dump boxes on the machines to replenish the supply of sand-resin mix. Hand levers control operation of a vibrator and an air cylinder operates a gate at the end of the pipes.

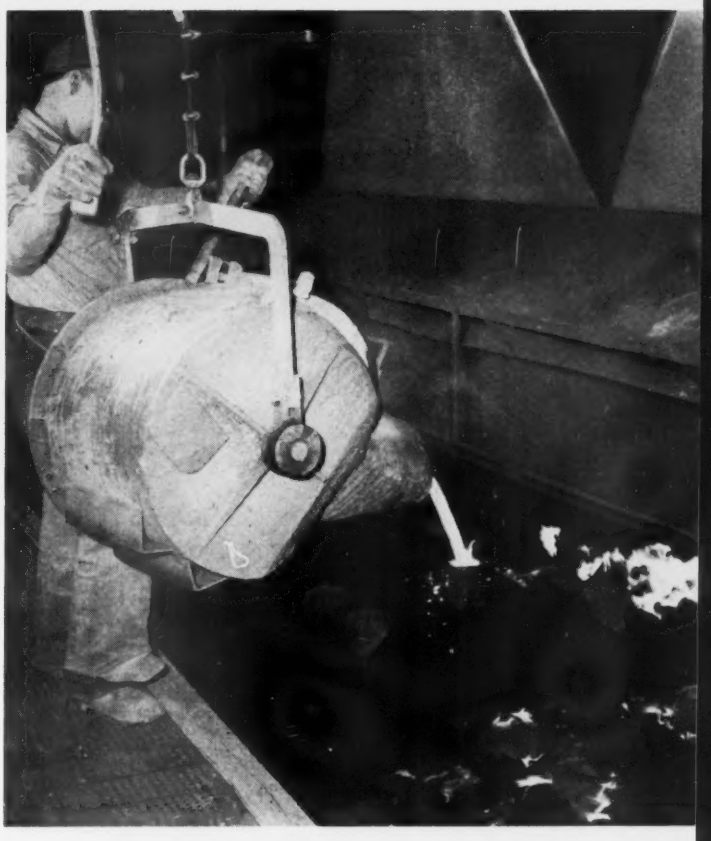
Ten automatic machines, arranged six in one row and four in the other, each can produce 20 shells an hour. Two of the machines are kept as standbys, production being maintained by the eight units. Patterns are made from gray iron with electrical resistance rod heaters embedded in the backs, following the pattern contours. Cavities into which the heating elements are inserted in the backs of the patterns are filled with powdered copper rammed to form a solid mass. Patterns then are bolted to flat plates which in turn are bolted to the rotating platen of each machine.

**Molding is Automatic**—All machine operations are performed automatically by air cylinders. The moldmaking cycle starts with the rolling of an automatic sprayer over the pattern to coat it with a wax solution. As the sprayer rolls back, the pattern is turned over and the dump box is raised and clamped over it. Then the platen with the box clamped over the pattern is rolled 180 degrees to dump the mix onto the pattern. Investment cycle for both cope and drag is 59 seconds.

The platen rotates again to return the dump box to its original position and turns once again to bring the uncured shell on top. The oven then is rolled forward on cam ways which raise it over and lower it onto the pattern. Oven is gas fired and maintained at 1000-1200° F. Copes are cured



Front dump trucks and a monorail charger feed cupolas through lower and upper charging doors



Operators pour molds while standing on powered escalators synchronized with the car conveyor

Fences on the shakeout pan turn and guide the crankshafts to a grooved oscillating conveyor

in 54 seconds and drags in 41 seconds. When the oven rolls back, the shell is lifted from the pattern by pins.

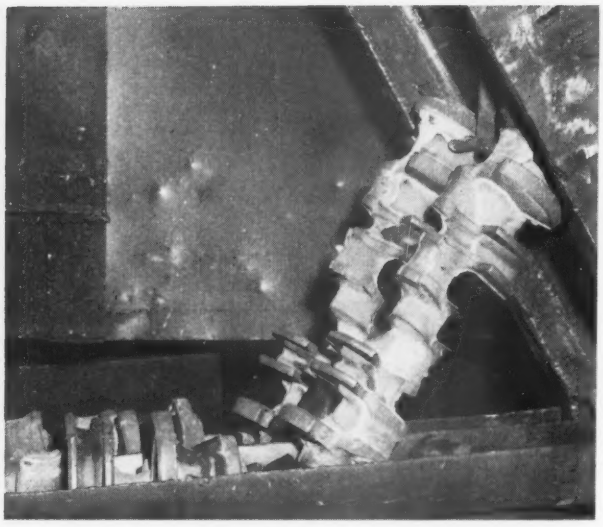
The machines are operated in pairs, one producing drags, the other copes. An operator removes the cope from its machine and sets it face up on the tops of coiled springs screwed onto bolts in a plate on an automatic clamping machine. On top of the shell he places an aluminum template shaped to cover mold cavities and leave, uncovered, certain parting surfaces. He swings a tray of dry resin over the template and pushes a button to vibrate the resin through holes in the tray which align with openings in the template onto the shell parting surfaces. As he swings the tray aside and removes the template, another operator removes a drag from its machine and places it on the cope. An operator presses two safety buttons, and air cylinders move the plate carrying the mold under a set of top springs, then up against the springs for the clamping. The plate and its mold then are returned to the front of the machine.

Both operators lift, turn and place the mold on angle iron rails of a set-off device from which an air cylinder automatically pushes the mold onto similar rails on an indexing, transfer conveyor.

The ends of these rails are attached to separate chains which have wheels on the link connecting pins. The two chains run in angle rails and over sprocket wheels at each end of the span. Conveyor is moved intermittently by an air cylinder with a 48-in. stroke. Molds are pushed automatically from the transfer conveyor to a storage conveyor or to a mold setting conveyor.

**Use Storage Conveyor**—Molds first arrive at the storage conveyor transfer point. Here each one may be pushed by air cylinder to storage automatically, or intermittent transfer can be made selectively through pushbutton control.

The storage unit is an overhead monorail chain conveyor electrically driven and automatically indexed one carrier length at a time. It operates near the ceiling except at the loading and unloading point where it drops to near floor level. Carriers are U-shaped frames attached to the conveyor at the closed end and having a set of angle rails near the open end of the U for receiving molds. When a carrier is in position to receive a mold, sideway is prevented by an air clamp which grasps a bar welded to the carrier bottom. Fore and aft movement as the mold is pushed into place is eliminated by a bar on the conveyor frame-



Crankshafts are picked off the oscillating conveyor by hooks mounted on a monorail conveyor

work against which the carrier legs rest when the carrier is in receiving position.

The conveyor holds 150 molds and moves in one direction for loading and in the opposite direction for unloading. Molds are moved off the storage unit automatically or selectively by an air cylinder pusher.

Just past the storage loading and unloading point molds are pushed automatically from the transfer conveyor by air cylinder to the mold setting conveyor. This conveyor is similar to the transfer conveyor except that molds are carried on the bottom strand inside the conveyor loop. This method of handling is necessary because the mold setting conveyor must be high enough off the floor to pass over the car-type pouring conveyor.

**Molds Bedded in Green Sand**—Molds are pushed by air cylinder from the setting conveyor to a setting device which lowers them to a bed of green sand on the conveyor cars. The device is raised and lowered automatically by air cylinder and consists of four legs descending from a top plate. Angle rails on each of two sets of legs receive the mold from the settling conveyor. When the mold is in place an arm at the front of the setting lowers to engage the front edge of a car on the conveyor and thus move the setter with the conveyor. The mold is lowered to the sand bed on the car, and the legs open to release the mold. A rectangular vibrating device inside the setter legs lowers and presses against the top edges of the mold to bed it firmly in the sand. An air cylinder returns the setter to its original position to rereceive another mold.

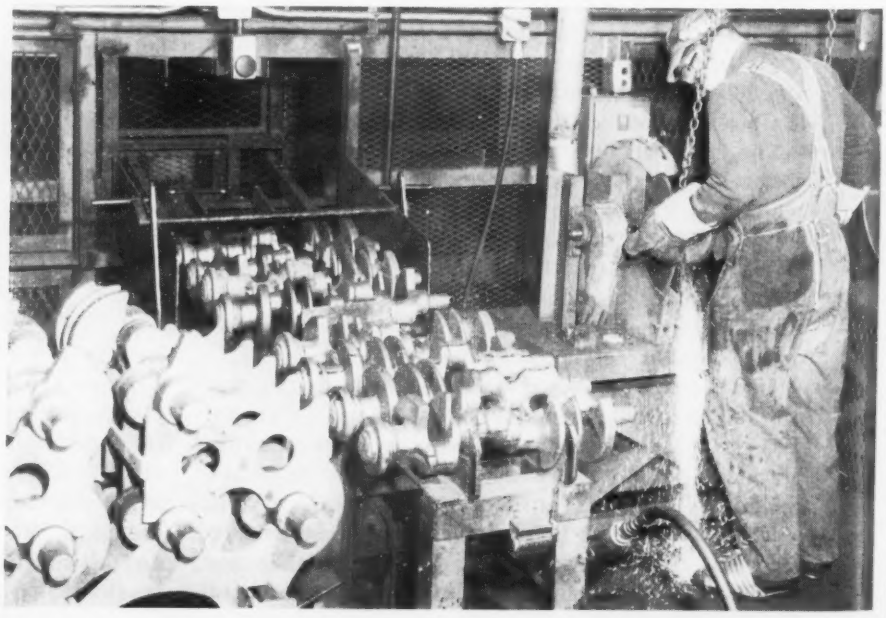
Open-end boxes are welded to the car tops on the pouring conveyor to facilitate holding the bedding sand. Sides of these boxes are at 90 degrees to the line of conveyor travel and are 9 in. deep. A shuttle carrier moving on angle rails at 90 degrees to the line of conveyor travel deposits a 4½-in. bed of sand on the cars just ahead of the mold setting device. The carrier box receives a measured amount of sand from a hopper, then moves by air cylinder over the car conveyor. A cut-off plate on the carrier holds sand in the hopper. Louvres in the carrier box are opened and closed in quick succession by an air cylinder to deposit the sand. Sand is leveled by an air cylinder-operated rake.

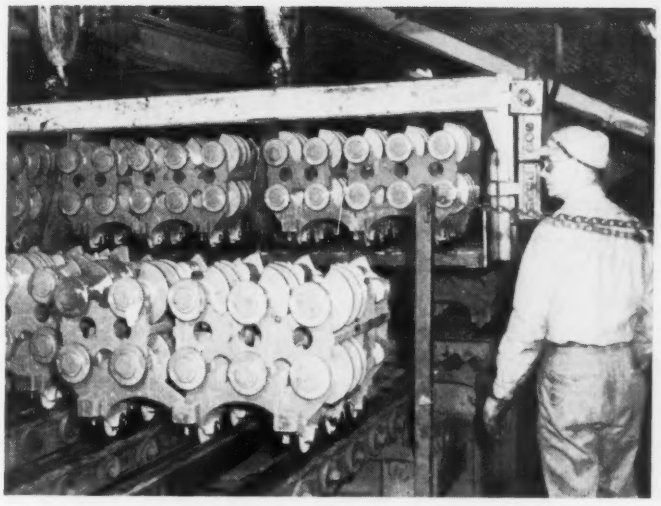
Bedding sand is prepared molding sand used on an adjacent line in the malleable foundry. It is plowed off an overhead conveyor belt to the bin which has sprinklers at the top to add additional water. Moisture content of 6-7 per cent is desired for bedding.

After the mold is set, topping green sand is deposited by a device similar to the bedding sand depositor. However, U-shaped tunnels under which

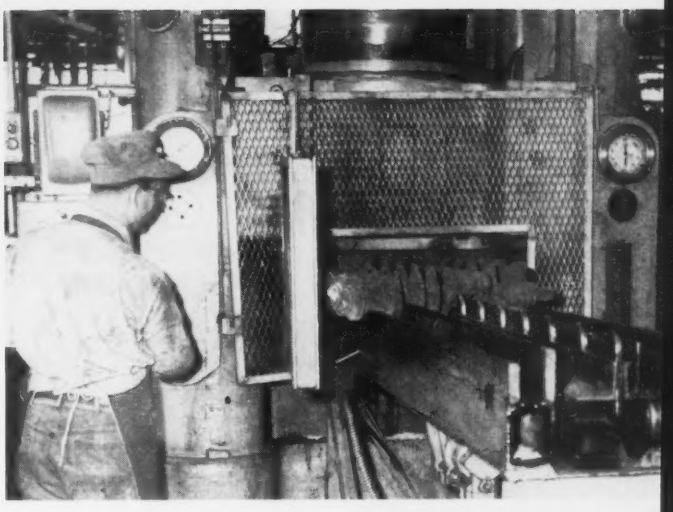
Tilting device tips cooled cranks so they may be engaged by hooks on blast cabinet conveyor

Walking beam deposits cranks on storage rails which supply workers at six grinding stations





Powered monorail dispatch carrier holds three batches of castings and is pushbutton operated



Crankshafts are fed to a straightening press, one at a time, by dogs on an air-cylinder shaft

the molds pass prevent sand from entering the sprue hole and piling up on top of the high points of the mold. Pendulum scrapers remove excess sand. Spilled sand from the bedding and topping operations falls through the grated floor to a belt conveyor for return to the system.

Regular black molding sand is used for the bedding function to increase the casting cooling rate and prevent mottling of the iron. Thus the desired structure for pearlitic malleable iron is retained.

**Melting**—Purchased scrap is handled in the yard by a 10-ton bridge crane and magnet. It lifts steel scrap and bundled sheet metal to separate troughs on the charging deck. An operator seated in a front-dump truck controls, through pushbuttons, operation of slow-moving apron conveyors at the bottoms of these troughs to dump metal into his truck. The truck rests on a scale platform, and the operator watches the scale dial to control his load. The truck is driven to the lower of two cupola charging doors and the load dumped.

Gating metal from the malleable foundry lines is collected on an oscillating screen with an end gate air cylinder operated by pushbutton to feed into cone-bottom charging buckets resting on a rail section connected to a scale. Loaded buckets are moved by platform gas trucks to a bridge crane cupola charger, which lifts them above the charging floor, moves them to a cupola and charges them into the upper charge door.

The crane operator then deposits the empty bucket on a scale on the charging floor so that it may be filled with coke from an overhead bin and chute. A full bucket of coke is picked up and charged and returned to the foundry floor to be filled with gates and risers.

Four continuous-tap, 112-in. cupolas melting 37 tons an hour furnish metal for the malleable foundry. They are back slagging units, and slag falls into a water sluice. Cupolas are operated in pairs on alternate days and feed into two forehearths of 15 and 18 tons capacity. The forehearths feed two 15-ton electric furnaces which bring the metal to about 2750°F.

Chemical tests are run on the iron every 20 minutes. The desired composition is 2.55 C, 1.40 Si, 0.45 Mn, 0.12 S and 0.05 P. Tensile strength is 80,000 psi, yield strength 66,000. Elongation in 2 in. is 2 per cent.

**Pouring**—Operators standing on powered escalators synchronized with the car conveyor pour molds under an exhaust hood. Ladles, suspended from an overhead monorail loop, are electrically raised and lowered and hand tilted.

After rounding the end of the pouring line loop the car conveyor carries the molds down to a basement cooling tunnel where they cool for 36 minutes. The conveyor rounds the other end of the loop before ascending to floor level again. It immediately enters a rectangular vented enclosure where the sprue and risers are knocked off by two air cylinder-operated pendulums, which are swung down over the mold from each end simultaneously. As the conveyor emerges from the enclosure, two air cylinder-operated claws move the broken gates and risers to chutes along each side of the conveyor. The scrap falls to an oscillating pan conveyor, which forms part of the basement shakeout handling system for the malleable foundry.

Just beyond this point the crankshafts and remaining sand on the car boxes are pushed off by an air cylinder to an oscillating conveyor, which has a perforated pan at the push-off area through which sand falls to the below-floor-level conveyor. The oscillating conveyor carrying the cranks has a pan formed into two channels. Each carries a crank with the flanged end at the front. As the cranks are pushed from the car conveyor, one hits the oscillating pan in the correct position and is guided by a plate steel fence on the shakeout pan into the proper conveyor channel. The second crank hits the pan, pin end first, and is turned by a second fence and guided into the other conveyor channel.

**Automatic Casting Pickup**—At the end of the

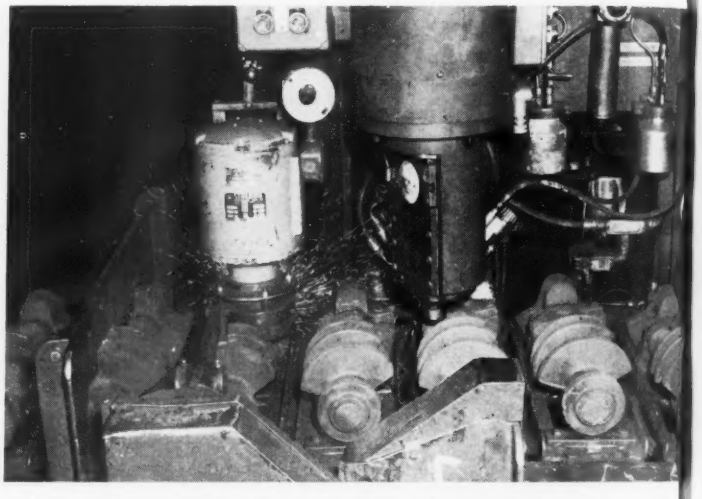
grooved oscillating conveyor the cranks are picked up, two at a time, by monorail conveyor-mounted hooks which engage the flanges. The monorail travels upward at about a 45-degree angle to the oscillating conveyor to facilitate engagement of the flanges by the hooks. Castings are carried outside for cooling.

When the monorail conveyor re-enters the building, the castings are carried over a rubber roller, which tilts them off the hooks to a double grooved chute with a tilting device at the bottom. Part way down the chute, however, is a hand-actuated, air-powered stop which holds the cranks from sliding onto the tilt if it is not empty. An operator controls air-cylinder tilting of the chute by lever. Cranks are tilted two at a time with the flanged end up so that double hooks on a horizontally traveling monorail chain conveyor can engage the cranks and carry them through an airless blast cabinet. Blast cleaning is done with No. 390 steel shot.

As the cranks emerge from the cabinet they are removed from the hooks by hand and visually inspected. Defectives are put in a chute leading to a tote box for removal by fork truck. Good castings are put in fixtures on a walking beam, which indexes to and fro to deposit the cranks on rails at three grinding stations. Stops at the receiving ends of these rails are controlled by grinder operators to permit the cranks to roll down to them or be carried by the walking beam to the next station.

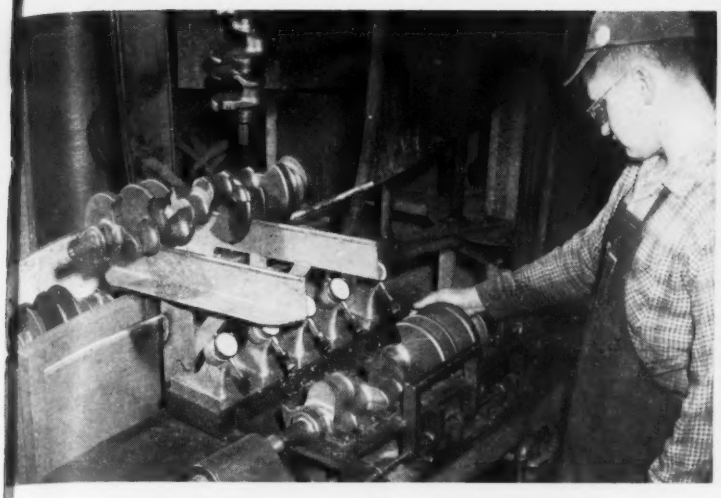
Six stand grinders, two on each side of the three rail storage sections, are used to remove fins and gate stubs. Three additional operators use portable air grinders equipped with mounted points for touching up hard-to-get-at areas. These operators also lift the cranks with air hoists to wheel-mounted fixture trays, which hold upper and lower rows of five cranks each. The trays sit on channels in three waist-high tables so that they may be rolled onto a shuttle car, hand moved along rails across the ends of the tables. Trays are rolled from the car to any of three flat top chain conveyors which are energized intermittently by pushbutton to carry the trays to a monorail dispatch carrier holding three of the fixture trays.

**Heat Treating**—By pushbutton control the carrier raises to the monorail and automatically starts and propels itself along the rail to a gas-fired radiant-heated annealing furnace. There it stops automatically and lowers to three sets of storage rails under the furnace. Next an operator hooks the wheeled trays off the carrier to the rails and onto an elevating track section, which raises three trays of castings at a time into the furnace. There an electric pusher moves them through the furnace. The furnace holds 49 rows of trays, three abreast, and as one row is pushed off the elevator another row is pushed out the end of the furnace. A push is made approximately every 25 minutes and cast-

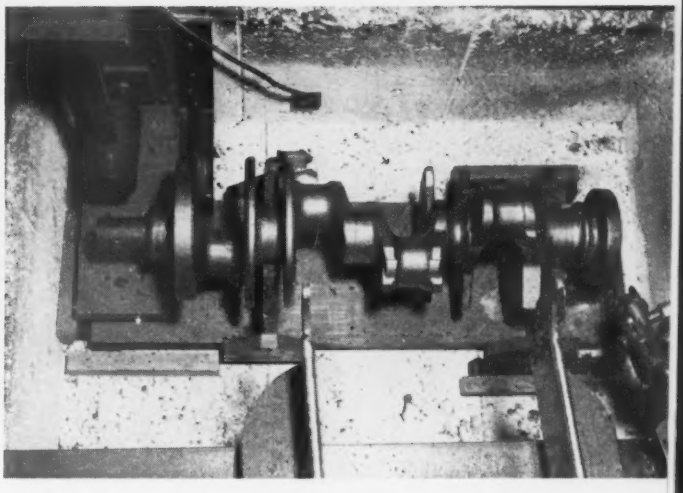


Automatic brinell testing machine checks castings and releases them to gravity storage rails

Hand-pushed monorail carrier at right brings cranks to machine for milling the ends and drilling lathe center points. Men use air hoists to move the castings



Paddle gage is used to check all of the cranks for swells, oversize sections and straightness



Sonic tester hits casting, classifies resulting sound and sprays good castings with yellow dye

ings are in the furnace for about 20 hours. There are nine temperature zones in the furnace ranging from 1400°F at the first to a high of 1750°F and down to 1680°F in the ninth. Castings leave the furnace by a lowering elevator and are electrically pushed under a hood and air quenched for about 25 minutes.

Trays of castings are hooked onto the same dispatch carrier and carried to the draw furnace where they undergo the same handling as in the quench furnace. In this furnace, however, a push is made about every 10 minutes and castings go through in approximately 8 hours. Nine temperature zones raise the castings from 1050°F at the first to 1290°F at the ninth. Upon leaving the furnace the three batches of castings are pushed into a holding furnace, which keeps them at 1220 to 1240°F. Each of the three trays in the holding furnace rests on a separate platform which is lowered by air cylinder to a set of tracks. Trays are pushed by air cylinder, one at a time, to another elevating track section which holds three trays of castings.

Castings are lifted from the tray by a jig on an air hoist suspended from a monorail and moved to a track section feeding a straightening press. When the three trays have been emptied, they are raised by the elevating track section and rolled off to the dispatch carrier for return to the grinding area.

Crankshafts are fed to the straightening press one at a time by dogs mounted on an air-cylinder shaft. The press hits the casting in one position, then turns it 90 degrees automatically and hits it again before ejecting it to a roll-out set of rails. An air cylinder-operated jig at the ends of these rails raises single cranks in position to be picked up by hooks on a monorail chain conveyor and carried outside for cooling. After 2 hours and 40 minutes the conveyor re-enters the building and lowers through a set of rails, which removes the cranks and allows them to roll down to an air pusher. The latter places them in holders on an automatic brinell testing machine.

**Brinell Testing Is Automatic**—Cranks first are carried under a grinder which grinds one spot, then under the brinell unit for the impression. Satisfactory crankshafts have a brinell range of between 217 and 269.

Cranks roll from the testing machine to a gravity storage rail. Operators lift them with balance hoists to either of two automatic milling machines for cutting off the gate stub at the pin end of the crank. Then they are hung on double hooks of a monorail chain conveyor for transport through an airless blast cabinet and cleaned with No. 390 steel shot.

When cranks emerge from the cabinet, operators hand load them to monorail carriers holding six cranks. Carriers are hand pushed along the monorail to three machines for milling the ends and drilling lathe center points. Machine operators use air hoists to remove and replace cranks on the carriers.

As the carriers are pushed to the far end of the monorail loop, the cranks are removed individually by hand and placed in a fixture with air-operated pins which engage the lathe center points. A paddle gage is lowered into position and the crank turned to check for swells, oversize sections and straightness.

Then the crank is hung on an indexing wheel revolving in a horizontal plane which dips it into a magnetic carrier solution and carries it through ultraviolet light for observation by an operator for defects. Another operator removes the crank from the wheel and sets it on an air cylinder device, which lowers it into a sound-proofed box for sonic testing. In the box the crank is hit by an air-actuated hammer and the frequency of the resulting sound is classified by an electronic unit. If the crank emits the correct sound frequency, it is sprayed automatically with yellow dye, raised out of the box and pushed by an air ram to rails. Defective cranks are hand lifted from the box lowering device and scrapped. Satisfactory cranks are removed from the rails to skids for movement by lift truck to box cars for shipment.

Fig. 1—Casting was made with exothermic-lined conventional risers. One is burned through vertically

Fig. 2—A closeup of sectioned riser in Fig. 1. Cavity at the bottom was formed by a domed core

# How To Use

# Moldable Exothermic

FOR MANY years, exothermic feeding compounds have been used in foundries to produce sound castings at lower cost. Until the last ten years or so, however, the composition of these materials restricted their application to the exposed surfaces of feeder heads.

With these hot topping compounds, as they have become known, the yield that can be obtained for any given casting consequently is governed, in the main, by the nature of the hot topping compound used—that is, by whether it is mildly or highly exothermic, metal producing or nonmetal producing. The ideal exothermic compound for obtaining high casting yields with sound castings is one that can be molded into shape and made to line the riser cavity, as basic thermal considerations readily prove.

Moldable exothermic compounds are a relatively new development, but they have been applied successfully to all types of castings. In fact, their use has become standard practice for risering castings in many foundries throughout the world during the last eight or nine years.

This presentation will discuss the application of such compounds and explain a method, based on conditions found necessary in actual practice to give maximum efficiency, for calculating the size of feeder heads lined with them. This method of calculation deals with simple shapes, but can be used just as well for more complex castings.

**Properties**—Moldable exothermic compounds basically are mixtures of aluminum, oxidizing agents and refractory powders. Other additions are made to control permeability, density, thermal diffusion of the reacted material and the expansion of the material on burning. Metallic halides are added which impart a fluxing action on the aluminum particles and promote good combustion. Typical physical properties of moldable exothermic materials are shown in Table I.

**Production of Shapes**—The grades of moldable exothermic compounds now available to foundries contain water-soluble binders. When they are mixed with the correct amount of water, any

**TABLE I—Properties of Moldable Exothermics**

| | |
|---|---|
| Green compression | 1 to 2 psi |
| Dry compression | 400 to 500 psi |
| Dry permeability number | 150 to 180 |
| Rammed density (3 rams) | 1.65 grams per cc |
| Calorific value | 2250 cal per gram |
| Thermal conductivity of fired exothermic material at 1472°F | 0.0017 cgs units |
| Thermal conductivity of fired exothermic material at 2732°F | 0.0024 cgs units |
| Thermal conductivity of typical bonded molding sand at 1472°F | 0.0022 cgs units |
| Thermal conductivity of typical bonded molding sand at 2732°F | 0.0050 cgs units |

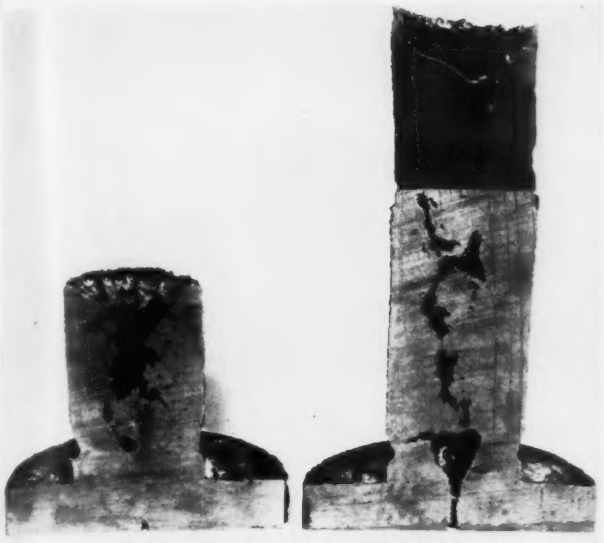


Fig. 4—Effects of using lined risers 3 in. in diam when one is 6 in. high and the other 11 in.

Fig. 5—Effects of increasing the diameter from 3 to 3½-in. Heights here are 5 in. and 8½-in.

# Compounds

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shape required can be produced. Water content must be controlled fairly accurately, for high water contents (above manufacturers' recommendations) tend to cause the molded shapes to sag in the green state and to split and distort during drying. If the water content is low, shapes can be made easily, but the dried shapes are weak and friable and do not withstand the handling necessary.

Mixing can be done by hand or mechanically. When mixing is done by hand, it is desirable to wet the material a little at a time and to let the completely wetted mix stand for about 20 minutes. During that time a certain amount of green strength develops. With mechanical mixing, care is necessary to avoid over mixing, which tends to make the material "ball up" and be hard to ram. This condition also can cause delayed ignition in the shape. The best type of mixer to use is one with rotating paddles. Such a unit reduces the tendency to "ball up."

When the wetted material is rammed into shapes —sleeves are the most popular—care should be taken to insure that the sleeve, for example, is rammed lightly. This precaution keeps the apparent density of the material at a minimum and eliminates the possibility of blowing when metal enters the sleeve. We should note that the degree of ramming affects the sensitivity of the material. Hard-rammed shapes take longer to ignite than lightly-rammed shapes. For a high production rate, it is advisable to install a coreblower or jolt machine. Coarse materials are more easily blown than finer ones, incidentally.

Drying temperatures should not exceed 400° F; above this temperature, shapes may ignite in the oven. The coarse type of exothermic compound requires approximately one hour of drying per inch of thickness at 350° F; fine materials require about 50 per cent more drying time. Other grades are available which can be dried at temperatures up to 650° F. These grades are suitable for application to large steel castings which re-

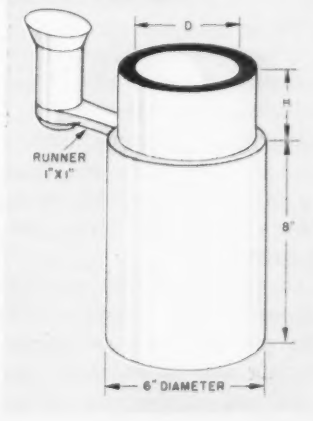



Fig. 3 — Series of test castings of this type was cast with varying heights and diameters. Results of these tests are shown in Figs. 4-8

Fig. 6—In this test, diameter of the risers was 5 in. One was 4 in. high and the other was 6 in.

Fig. 7—Results with 3, 3½ and 5-in. diam risers, each of which contained 35% of volume of casting

quire risers with an internal diameter of 6 in. or greater.

Fabricated shapes can be stored for an indefinite length of time, providing they are stored in a dry atmosphere. The molded shapes pick up moisture on standing in damp atmospheres and in green sand molds, but they can be redried without interfering with the thermal efficiency in any way. Sleeves generally should not be allowed to remain in green sand molds for more than about five hours.

**Dimensioning**—For a clear picture of how the use of moldable exothermic compounds affects riser dimensioning, we can consider some early experiments. Since no information was available at the time of these experiments on which to base calculations of riser size, conventional risers were lined with layers of exothermic material and the solidification characteristics noted. Pipe (or shrinkage) that occurred in conventional risers in many cases was eliminated completely and in others was greatly reduced. Porosity in risers was confined to a small area adjacent to the top surface.

Fig. 1 shows a casting produced with exothermic-lined conventional risers. One riser is burned through vertically. Fig. 2 shows a closeup of the sectioned riser. The head was 15 in. in diam and was lined with 1½-in. of exothermic compound. The cavity at the bottom of the riser was formed by a domed core.

These experiments proved that it was possible to reduce the height of conventional risers by using an exothermic lining. In fact, with such linings, sound castings were produced with risers only one-third to one-half the height of those normally used.

Although reduction of riser height offered advantages, further advantages were to be gained by reducing riser diameter. Accordingly, numerous castings were made with exothermic-lined heads both shorter than usual and smaller in diameter. On some castings, the risers sank in a flat feed; on others, shrinkage pipes were formed, which varied in severity.

It therefore was apparent that under certain circumstances, solidification did not take place on the walls of the exothermic-lined riser until the casting was in the last stages of solidification.

To use exothermic materials to the greatest advantage, it was necessary to obtain the level of flat-type of feed. Experiments were undertaken to determine under what conditions an exothermic-lined head would give this sort of feed.

The tremendous amount of work which then was carried out on types of steel castings, ranging in weight from a few pounds to several tons, brought to light some important factors affecting riser dimensioning. These factors are:

1. Diameter of the riser in relation to the thickness of the casting section is the most important factor influencing the type of feed obtained.
2. Height of the riser is not important, provided that the diameter is such as to give a level-type of feed and provided that there is enough metal in the riser to feed the casting and give a reasonable safety for normal foundry variables.
3. The grade of steel cast does not affect results materially.

Results obtained on these widely varying types of castings are illustrated in accompanying Figs. 8 through 13.

A series of test castings of the type shown in Fig. 3 were cast with exothermic-lined risers of varying heights and diameters. All castings were poured from a 4-ton ladle. Since the castings weighed only about 70 lb each, the temperature drop during pouring can be ignored. Temperature of the metal in the ladle was 2840 to 2855° F.

In the first series, the volume of the risers was kept constant at about 20 per cent of the volume of the casting, and diameters and heights were varied. In the second series, the percentage of riser by volume was kept constant at 35 per cent, and diameters and heights again were varied.

Fig. 4 shows the effects of using 3-in.-diam lined risers of two different heights. The riser 6 in. high corresponded to about 19 per cent of the casting volume, and the 11-in. riser was about 35 per cent. In both instances, piping took place in the riser and extended into the casting. The extensive piping was clearly visible after sectioning.

Fig. 5 shows the effect of increasing diameter of the risers to 3½-in. A height of 5 in. corresponds to a riser 21 per cent of the volume of the casting, and 8½-in. corresponds to 36 per cent. Although both castings appeared sound, the risers showed piping, and gamma-radiographing of a sec-

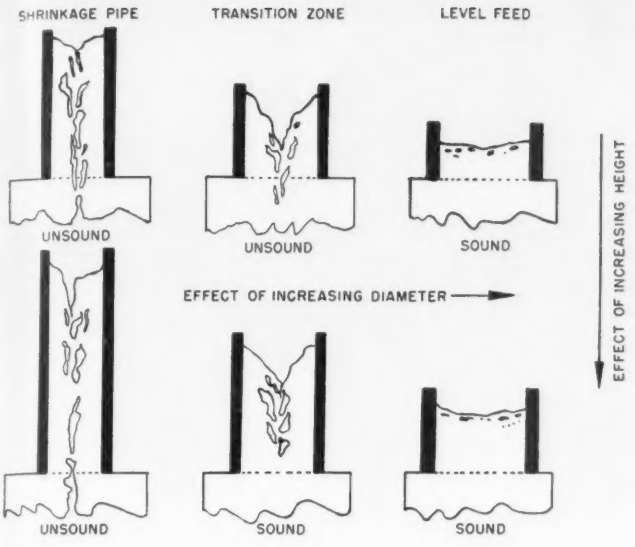



Fig. 8—A diagrammatic representation of tests in which riser heights and diameters were varied

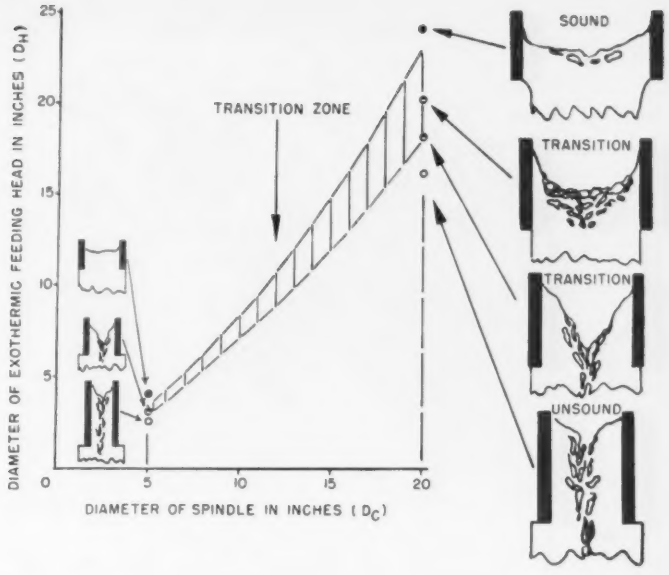



Fig. 9—Diagram shows how transition between piping and level feed depends on diameter of sleeve

tion taken 1 in. below the head revealed microporosity.

The results obtained with two 5-in. diam risers are illustrated in Fig. 6. The riser 4 in. high corresponds to a volume of approximately 36 per cent of that of the casting, and the riser 6 in. high represents 54 per cent. Both sank in a level feed, the only difference being that there was more sound metal in the riser which contained 54 per cent by volume. Both castings were radiographically sound.

Fig. 7 groups these results together to show the effect of increasing riser diameter. It pictures the 3, 3½ and 5-in.-diam risers containing about 35 per cent of the volume of the casting.

To sum up this early experimental work, there definitely is a transition between piping and the level type of feed which depends on the diameter of the sleeve, not on the height. Results are represented diagrammatically in Fig. 8.

Risers in the upper series of sketches are drawn with increasing diameter, but approximately the same volume. With the smallest diameter, extensive piping takes place, extending into the casting. As the diameter is increased, piping becomes less severe until a flat type of feed is obtained. The lower sketches show the effects of increasing the riser volume, while maintaining the same diameter, by increasing the height of each riser.

In risers of the smallest diameter, below the transition point, an increase in height does not bring the pipe outside the casting. In the intermediate stages, an increase in height may bring the pipe outside the casting. With risers which give a flat type of feed, an increase in height gives more sound metal in the riser, and the typical flat feed is maintained.

Fig. 9 shows diagrammatically the transition which takes place. For a 5-in.-diam spindle or solid cylinder, the transition is sharp, and an increase

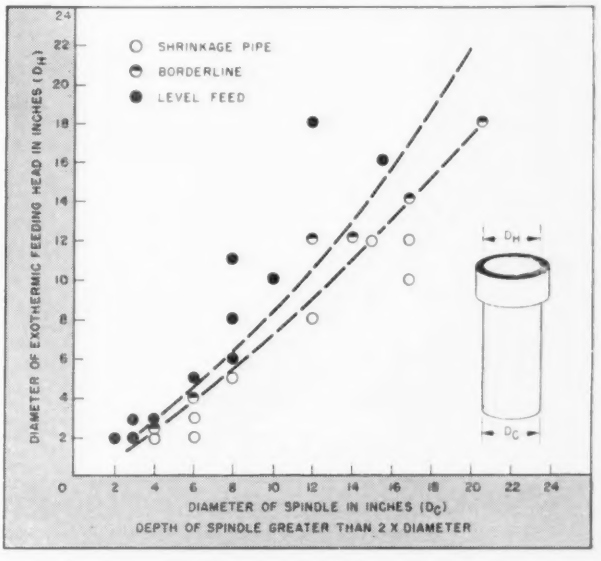

SHRINKAGE PIPE
BORDERLINE
LEVEL FEED
DIAMETER OF EXOTHERMIC FEEDING HEAD IN INCHES ( $D_H$ )
$D_H$
$D_C$
DIAMETER OF SPINDLE IN INCHES ( $D_C$ )
DEPTH OF SPINDLE GREATER THAN 2 X DIAMETER

Fig. 10—Correlation of results obtained with solid cylindrical castings with height twice diameter

in diameter of the riser from 3 to 4 in. results in a change from severe piping to a flat type of feed. For a 20-in.-diam spindle, the transition is not so well defined, and it required an increase in riser diameter from 18 to 24 in. to produce the flat type of feed.

Fig. 10 shows the correlation of the results obtained with solid cylindrical castings with a height greater than twice the diameter. With long cylinders such as these, the diameter governs the rate of solidification, and end effects are negligible. Ladle temperatures of the metal were between 2820 and 2920° F, and all the cyinders were cast on end with risers containing between 20 and 50 per cent by volume of the metal in the casting. The two lines show the limits of the transition in the type of feed. The type of transition that takes

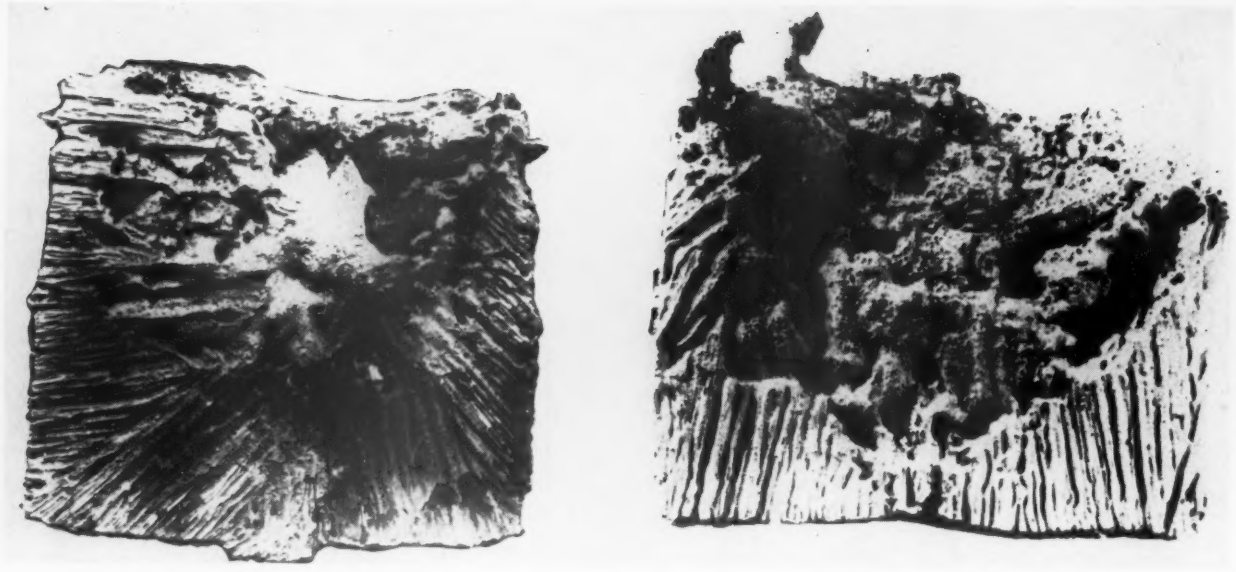


Fig. 11—Riser on left is 16 in. in diam and was taken from casting 15½-in. in diam. Riser on right is 18 in. in diam; it was taken from 20½-in. diam casting

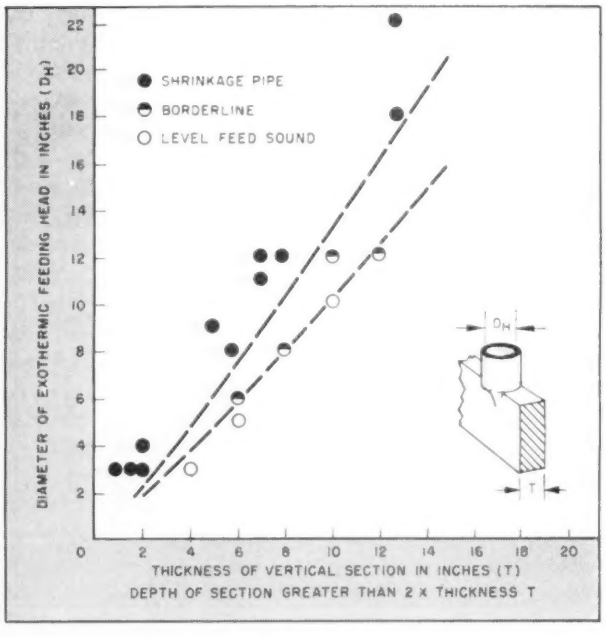

SHRINKAGE PIPE
BORDERLINE
LEVEL FEED SOUND
DIAMETER OF EXOTHERMIC FEEDING HEAD IN INCHES ($D_H$)
THICKNESS OF VERTICAL SECTION IN INCHES (T)
DEPTH OF SECTION GREATER THAN 2 X THICKNESS T
$D_H$
T

Fig. 12—Same results were obtained with risers on platelike casting as with those on cylinders

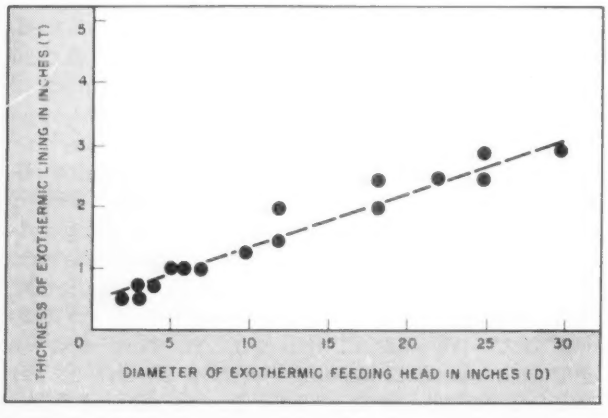



Fig. 13—Chart shows relation between diameters of risers and thicknesses of exothermic lining

place on cylinders of large diameter is illustrated in Fig. 11.

The 16-in. diam used on the left was taken from a casting 15½-in. in diam. Solidification has taken place on the sides of the sleeve, but there is a definite tendency toward a flat feed. The minimum riser diameter this casting would require to give a reasonably level feed would be about 17 in. The 18-in.-diam riser on the right was taken from a 20½-in.-diam casting. The shape of the pipe is different, and the pipe has extended almost to the casting. This example is typical of the transition which takes place. For this casting, a 25-in.-diam riser would be required to give a reasonably level type of feed.

**Similar Work on Plates**—So far, this discussion has described how the work carried out on cylinders has permitted a correlation between diameters of cylinders and diameters of risers. Exactly the same type of work has been carried out in the correlation of results on vertical plates.

Fig. 12 shows the results obtained with vertical, platelike castings in the form of rectangular plates cast on end and rings. The rings were of such diameter that the core exerted no influence on the mode of solidification, and the section solidified as a vertical plate. Again, the depth of the section was greater than twice the thickness, and the solidification time of each plate was determined by thickness. As with the solid cylinders, a layer of an exothermic compound was used on the surface of every riser.

Until now, we have considered only the determination of riser diameters in relation to section thicknesses of castings, and nothing has been said of riser positioning. This problem is complex and is dependent, to a degree, on feeding distance. The work of Bishop and Pellini definitely has established, however, that feeding distance is far more dependent upon the mode of solidification in the casting than on riser size, provided the size of the riser is sufficient to give a sound casting beneath

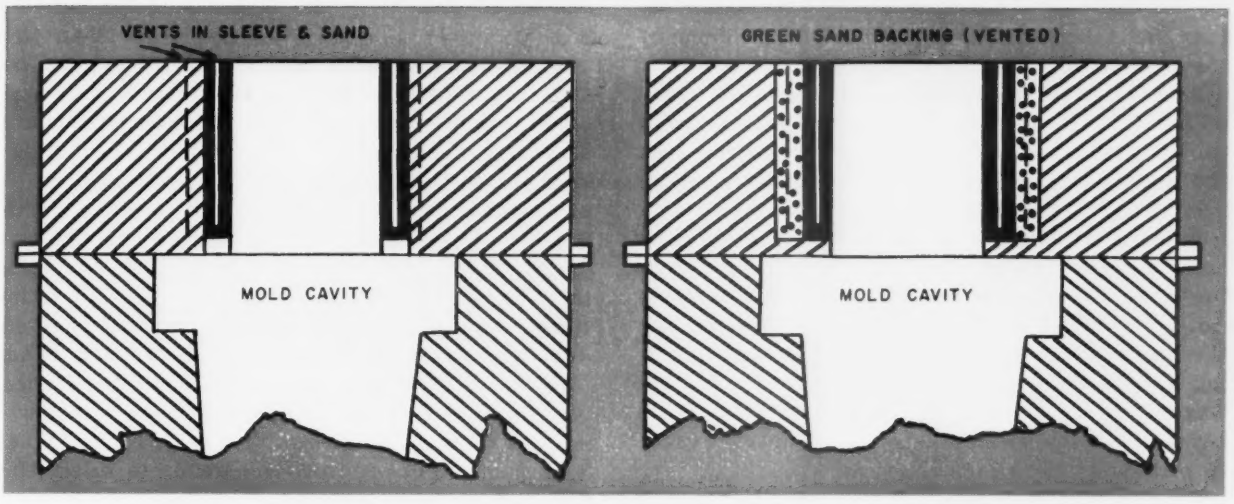



Fig. 14—Diagrams illustrate how exothermic materials can be applied in molding

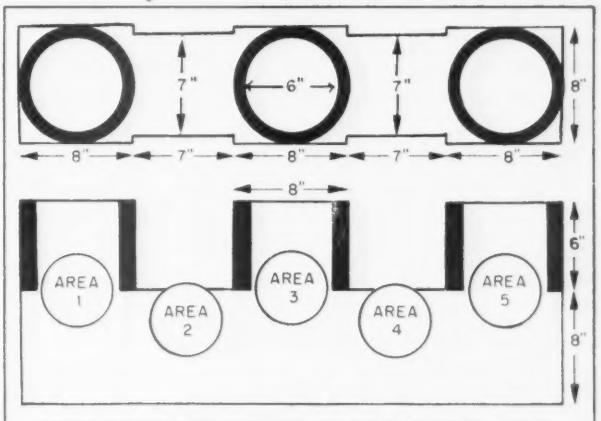
the riser. The work to date with exothermic-lined risers has not presented any evidence that the feeding distance is greater than with conventional risers; therefore, when riser positioning is considered, the same factors used for conventional practice should be applied.

In Fig. 13, the relation between diameters of risers and thicknesses of exothermic lining is shown. The thicknesses shown are those most commonly used in foundries. The economical aspect of using moldable exothermic materials makes it essential that lining thickness be kept to a minimum. As an example, a 4-in.-diam riser with a ¾-in. wall thickness will give a flat type of feed consistent with soundness on an 8-in.-diam, 3-in.-thick blank. If the wall thickness is reduced to ½-in., piping takes place; if the wall thickness is increased to 1½-in., no change in the type of feed takes place, but the riser remains liquid for a longer period of time.

At this stage riser heights can be considered. When the diameter of the riser has been determined, as already outlined, the height of the riser simply is adjusted so that sufficient metal is available in the riser for feeding the casting, with allowances made for normal foundry variations. All applications to date have shown that the riser should contain 20-30 per cent by volume of the casting.

This figure has been proved to give reasonable feeds under foundry conditions and takes into account any variation in shrinkage due to alloying elements and temperature of metal. It also allows a margin of safety for errors in pouring. Under conditions already discussed, with a 20 per cent head, it has been found that approximately half the metal in the riser feeds into the casting, corresponding to a shrinkage of about 10 per cent by volume of the total metal cast with a casting temperature of 2820° F.

This figure is not in accordance with published data on volumetric shrinkage of plain carbon steels. The exact reason for this high shrinkage figure is not clear, but it probably is due to changes in mold and core dimensions. It is possible that the values obtained are due to several changes taking




| ELEMENT | AREA | | | | | |
|---|---|---|---|---|---|---|
| | PIT | 1 | 2 | 3 | 4 | 5 |
| CARBON | 0.46 | 0.40 | 0.44 | 0.39 | 0.47 | 0.42 |
| MANGANESE | 0.76 | 0.72 | 0.75 | 0.72 | 0.76 | 0.75 |
| CHROMIUM | 0.913 | 0.893 | 0.900 | 0.890 | 0.910 | 0.886 |

Fig. 15—Analysis of metal at various points in a casting which was made with exothermic-lined heads

place during solidification, in addition to the intrinsic volumetric shrinkage of the metal. It is perhaps more accurate to call these values "apparent" volumetric shrinkage.

The following values have been obtained:

| Pouring Temperature | "Apparent Volumetric Shrinkage" |
|---|---|
| 2820° F | 9-10 per cent |
| 2910° F | 10-11 per cent |
| 3000° F | 12-13 per cent |

It is emphasized that these values are approximate since the accuracy with which they can be determined is not very great.

**Determination of Riser Size**—From the above data, it is possible to calculate the riser sizes for castings of almost any shape. With complex pieces, the casting should be divided into sections and each section considered separately. It then is relatively simple to determine the diameter of the riser and the thickness of the exothermic lining from the graphs that have been presented. Riser

height then is adjusted by simple calculation so that the riser contains 20-30 per cent by volume of the casting or section of a casting.

**Some Practical Considerations**—The usual method for applying exothermic materials in green sand work is to locate preformed exothermic sleeves on the pattern instead of the usual riser pattern and to ram the mold up in the normal way. As already mentioned, shapes rammed in a green sand mold absorb moisture if allowed to remain in the mold for lengthy periods before casting. This problem can be overcome in two ways: First, by wrapping the sleeve in waxed paper or, second, by not inserting the sleeves until just before casting. When waxed paper is used, it is essential to place vents between the shape and the waxed paper in order to prevent blowing.

Since molds are dried at temperatures above 400° F, it is necessary in dry sand work with the lower-temperature-drying exothermic materials to use a head pattern for forming a cavity into which a prefabricated sleeve can be inserted when the mold is cool.

For small-diameter risers, the sleeve or shape can be crush fitted into a cavity which has been molded to size. With the larger-diameter sleeves, it is desirable to mold a cavity larger than the outside diameter of the sleeve. The sleeve can be inserted into the cavity when the mold cools and held in position by green sand. These methods are illustrated in Fig. 14.

An alternative method for dry sand work is to use exothermic materials that can be dried up to 650° F. These materials are suitable only for use on larger-diameter risers, but it is possible to ram them in position in the green mold and to dry the completed mold. Shapes also can be prefabricated and rammed up on the pattern, as in green sand.

Moldable exothermic compounds can be applied best in jobbing foundries by producing sleeves covering a range of diameters, but only, for example, 3 or 6 in. high. It then is possible to select the diameter of sleeve required and to build the riser to the necessary height.

A question frequently is raised as to the effects of exothermic materials on the composition of the metal immediately below the base of the riser. Fig. 15 shows a test casting made with exothermic-lined heads and the analysis of the metal at various positions in the casting. As can be seen, there are slight decreases in the alloying elements immediately beneath the surface of the risers. These results have been reproduced on numerous castings.

**Some Applications of Exothermic Materials**—No mention has been made about the economical aspect of using moldable exothermic materials, but experience has shown that substantial savings can be made by their use. Figs. 16, 17, 18 and 19 show a few typical castings made with exothermic-lined risers, and the very high casting yields obtained demonstrate that substantial savings have been effected.

These illustrations show that casting yields of between 85 and 90 per cent are common—in fact, even higher yields are not unusual.

**Acknowledgment:** The authors would like to acknowledge the assistance of such colleagues as Dr. K. Strauss, R. F. Boddey and Dr. D. V. Atterton. They have been responsible for much of the information presented in this paper and for much of the research on moldable exothermic compounds.

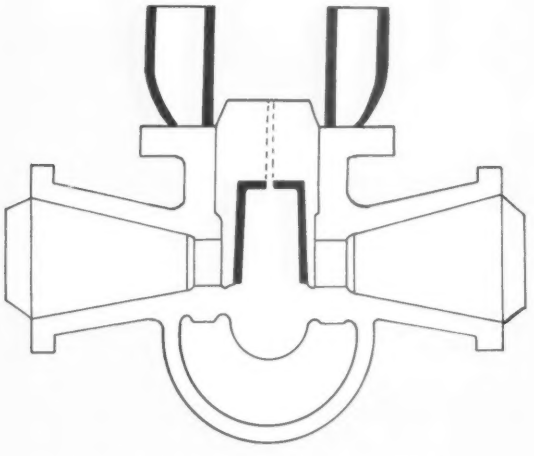


Fig. 16—Exothermic lining was applied to a blind riser which was incorporated in the core. Yield in production was 80-87%

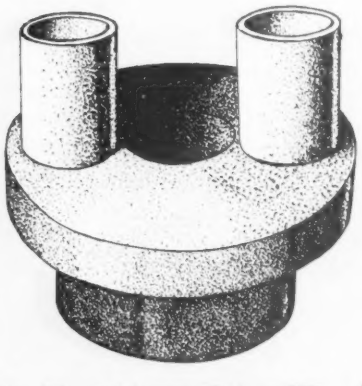


Fig. 17—Yield was 90% in 291-lb plain carbon steel casting

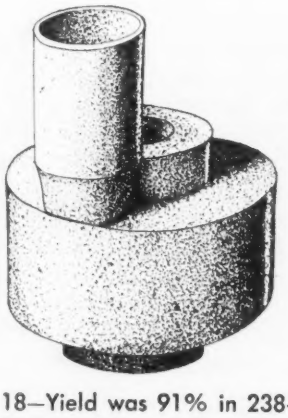


Fig. 18—Yield was 91% in 238-lb plain carbon steel casting

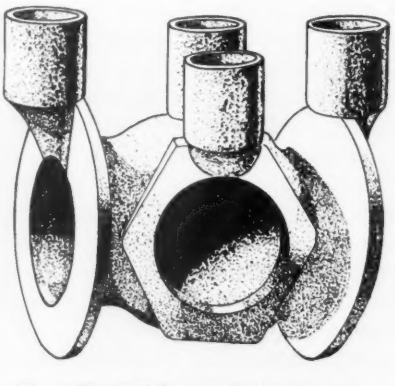


Fig. 19—Yield was 86% in this 351-lb Ni-Cr-Mo steel casting

# Brass Foundry Alloys

*The tenth article in Mr. St. John's series on The Brass Foundry concludes the discussion of brass alloy composition and application he began in March*

By HARRY ST. JOHN
*Foundry Consultant*

ALUMINUM bronzes are of two types. A small difference in the proportion of aluminum makes a considerable difference in the properties of the casting. One alloy of each type is listed below.

| ALLOY | 15 | 16 |
|---|---|---|
| Copper, per cent | 88 | 89 |
| Aluminum, per cent | 9 | 10 |
| Iron, per cent | 3 | 1 |
| Tensile strength, psi | 75,000 | 87,000 |
| Yield strength, psi | 33,000 | 47,000 |
| Elongation, per cent | 30 | 14 |
| ASTM Alloy No. | B148(9A) | B148(9B) |

The compositions and properties shown may be considered average. However, the properties shown for Alloy 15 are for the as-cast condition, whereas Alloy 16 must be heat treated to attain its maximum values. The dividing line is at about 9.5 per cent aluminum, up to which point the aluminum is present as an alpha solid solution in the copper. The iron, or manganese and nickel which are sometimes added, refine the grain and strengthen the alloy.

When aluminum exceeds about 9.5 per cent a new phase, the beta solid solution, appears. Above 11.5 per cent aluminum a third phase, the gamma solution, is found. On slow cooling, the beta solution breaks down to form a complex known as the alpha-gamma eutectoid. This is very strong, hard and brittle and is responsible for the enhanced physical properties of the heat-treated casting. Heat treatment usually follows machining of the as-cast metal. Treatment consists of heating the castings to about 1650°F, quenching in water and then soaking for an hour at about 1000°F. Both quenching and soaking temperatures vary according to the composition of the alloy.

The aluminum bronzes are high-shrinkage metals and require ample gates and risers. They have a short freezing range and consequently their pouring temperatures are not so critical as with the tin bronzes. However, as contrasted with the manganese bronzes, the use of a pyrometer is essential, as care must be taken not to pour the metal too hot. The greatest hazard in pouring is turbulence which will result in a foamy dross likely to find its way into castings. The sprue must be designed to prevent this, and gates must be so placed as to guard against sharp corners and abrupt changes of direction. For this reason it is often unwise to use patterns designed for the red brasses and tin bronzes. The same principle applies in the design of the castings which, designed for tin bronze, may be impossible to make in aluminum bronze.

The aluminum bronzes are suitable for pressure work at temperatures up to 500°F. They are particularly resistant to scaling and, in general, have good corrosion-resisting properties. Their hardness and toughness recommend them for worm gears and gear blanks, especially for use with hardened steel. They also make good bearings, particularly where sliding rather than rotating friction is involved.

**Copper-Nickel Alloys**—In the alloys of copper and nickel, nickel sometimes plays a dominant role even when copper makes up more than half of the composition. For example, at 20 per cent nickel the metal is practically white; the copper color has become completely obscured. Since copper and nickel are miscible in all proportions, we are dealing only with an alpha solid solution except for such other alloying elements as may be present. The following three alloys represent distinct types:

| ALLOY | 17 | 18 | 19 |
|---|---|---|---|
| Copper, per cent | 60 | 68 | 29 |
| Nickel, per cent | 20 | 30 | 67 |
| Zinc, per cent | 20 | — | — |
| Manganese, per cent | — | 1 | 1 |
| Iron, per cent | — | 1 | 2 |
| Silicon, per cent | — | — | 1 |
| Tensile strength, psi | 45,000 | 63,000 | 70,000 |
| Yield strength, psi | 20,000 | 32,000 | 35,000 |
| Elongation, per cent | 35 | 35 | 35 |

There are many other useful combinations of nickel and copper, too many to be fully described here since most of them will not often be encoun-

tered by the brass foundryman. As a rule their applications are highly specialized.

The importance of smaller percentages of nickel in various copper-base alloys has been discussed in previous articles. Of the three alloys above, Alloy 17 is one of the common nickel silvers. It is most often used for silver-plated tableware and for ornamental work where a white color is desired. Its use for plumbing fittings, except in marine work, is pretty much a thing of the past. Alloy 18 is a cupro-nickel, more resistant than Alloy 17 to localized corrosion. Its resistance to sea water is excellent, making it suitable for use in marine valve and pump parts and fittings. Alloy 19 is Monel, an alloy produced directly from a natural combination of ores, although it can be and often is synthesized. It is highly resistant to many forms of corrosion. One of its most important applications is in chemical plants, where its use for valves and fittings is extensive. It retains useful mechanical properties up to 900°F.

All of these alloys offer some difficulty in the foundry, especially if their use is not an everyday occurrence. Their solidification shrinkage is high and they are at the same time hot-short. Gates and risers must be ample and must be so designed that they do not exert a strong pull on the castings during cooling. Otherwise, hot cracks or tears will result. Gas porosity is another problem. Monel in particular is prone to absorb large volumes of gas. Degassing with dry nitrogen just before pouring is helpful. A cover of molten glass in the furnace is sometimes employed as a protection against gas absorption. This is quite effective but involves a messy skimming operation. Potassium permanganate is sometimes used as an oxidizing agent. Manganese-copper is used in the ladle to remove sulphur, the embrittling effect of which makes it a most undesirable impurity. Final deoxidation before pouring is accomplished by the use of magnesium but there should be little or no residue of magnesium in the casting.

Pouring temperatures for the high-nickel alloys range from 2400°F for the nickel silvers to 2600°F or more for Monel. Too low a temperature frequently results in porosity as a result of trapped mold gas. Synthetic sands with a moisture content around 3.5 per cent and a permeability of 35 are helpful.

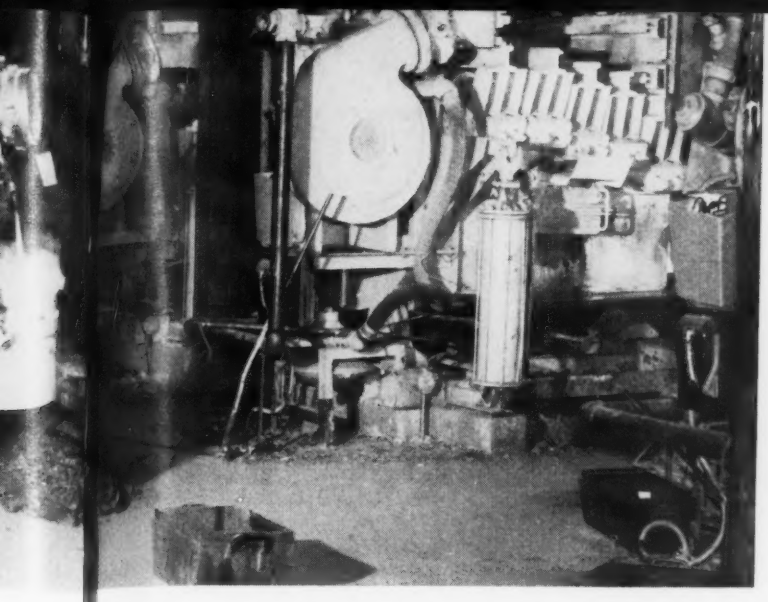
It should be apparent from the foregoing that the foundryman who expects to be a substantial user of the high-nickel alloys of copper should make a thorough study of their properties and foundry behavior. Although most brass foundries will not be faced with this problem, it has seemed worth while here to examine briefly the character of these alloys. Their high cost stands in the way of their use whenever a cheaper composition will serve almost as well, but to meet certain exacting requirements there is nothing to take their place except perhaps some of the stainless steels.

**Choice of Alloys**—There are several reasons why the brass foundryman likes to avoid the use of a multiplicity of alloys. For one thing there is the problem of keeping them separate which in most cases is vitally important. Increased storage facilities and the cost of inventory are factors. Unless the foundry employs small-crucible melting exclusively, the use of many alloys makes it difficult to co-ordinate the melting operation with the requirements of the molding floor. If the foundry is large enough to justify the use of high-speed efficient furnaces, a good plan is to use these units for the bulk of production in a small number of alloys and supplement them with a few small furnaces to take care of miscellaneous requirements. Obviously this promotes the desirability of general purpose alloys which can be used to fill most needs without alloy change. It must be remembered also that if aluminum or silicon bronzes are run in the same foundry with red brasses and tin bronzes, extreme care must be taken to prevent the slightest contamination of the red metals with silicon or aluminum.

In these articles 19 alloys have been described in some detail; possibly a dozen others have been mentioned as best fitted for some specific use. It can be said rather confidently that 30 alloys will fill almost every need the brass foundry is ever called upon to meet, assuming of course a certain amount of co-operation from the people who write specifications. In other words, when the foundryman is allowed to choose his own composition, he can find what he needs in so small a list of alloys.

**Structural Parts**—In one place or another almost all alloys are used as structural or supporting members. If great strength, color or specific resistance to corrosion are not factors, anything which happens to be handy will do.

For great strength (say 100,000 psi), coupled with a fair degree of elasticity, manganese bronze is often preferred. At more moderate strengths (75,000 psi) aluminum bronze or silicon bronze offer greater resistance to many forms of corrosion. At about this same strength level Monel gives maximum resistance to chemical corrosion and better properties at high temperatures. At lesser strengths there is a wide choice, with nickel silver sometimes chosen because of its white color.



**Transmission of Fluids**—Valve bodies and fittings must be pressure tight but the pressure limitations are exceedingly varied. For use in chemical plants or at high temperatures, Monel is a favorite choice. For most gases and liquids at pressures up to 2000 psi and moderate temperatures, modified gun metal (88-8-4) may be chosen. Silicon bronze is another good alloy in this range. For more moderate pressures and temperatures up to 500° F Navy M (88-6.5-1.5-4), silicon bronze or aluminum bronze may be selected. At moderate pressures and somewhat lower top temperatures, red brass (85-5-5-5) is widely used. Low-pressure valves and fittings, up to 150 psi, may well be made from semi-red brass (81-3-6-9). For plumbing fixtures, where the pressure seldom exceeds 40 or 50 psi, semi-red brass and yellow brass are favorites.

**Bearings**—For heavy-duty, slow-speed bearings, gun metal (88-8-4) is often used; for higher speeds, 89 copper, 10 tin, 10 lead; for car and locomotive bearings, 77 copper, 7 tin, 16 lead, backed with steel. Silicon bronze can replace gun metal. The phosphor bronzes also belong in this group.

Phosphor bronze and aluminum bronze are used for worm gears and wheels. Hardened gear blanks may be made from 89 copper, 11 tin, chill cast. Aluminum bronze is suitable for wear plates.

**Marine Fittings**—For salt-water service, including propellers, manganese bronze has enjoyed wide use. Silicon bronze is also serviceable for all sorts of marine work including pump bodies and impellers. Gun metal is used for pump bodies and parts, as are also the high-nickel alloys.

**Miscellaneous Applications** — For architectural and ornamental work, color and often resistance to weathering are of importance. For a white color the high nickel alloys are used. For a bronze-colored patina the tin bronzes, or silicon bronze, or even red brass, are satisfactory.

Bells of fine tonal quality can be made from silicon bronze, although the high-tin bronzes are more usual.

Pure copper is still standard for castings of high electrical conductivity. However, the heat-treatable alloys of copper with tiny percentages of silicon, cobalt, chromium etc. are stronger, attain an equally high conductivity and are easier to handle in the foundry. There seems to be little reason why pure copper should continue to be specified.

The copper-beryllium alloys have excellent physical properties and a variety of specialized applications. Nonsparking hammers, chisels and other hand tools, made from these alloys, excel in hardness and wearing qualities.

Few if any brass foundries are called upon to make castings for all of the varied applications for which nonferrous metals are most suitable. Some are so fortunate as to be able to confine their activities to one alloy and thus enjoy a very considerable operating economy. In most instances any single foundry handles anywhere from three to a dozen or more compositions. Every added alloy adds to fixed charges and operating costs. If the foundryman were free to choose, with no limitations by customer's specifications, he could reduce his costs substantially. The foundryman must buy his metal by chemical specification because the composition of the metal influences its behavior in the foundry. The foundryman's customer, however, is really concerned only with the physical characteristics of the casting, not with its chemical composition. He cannot rely exclusively on chemical specifications to produce the desired properties because only when the metal is well handled in the foundry will the expected properties be obtained.

A study of the considerable number of nonferrous alloys in use discloses the interesting fact that some 75 per cent of all requirements can be met by two alloys—a low-tin bronze, such as 88-6.5-1.5-4, and a silicon bronze. If these alloys could be considered as standard the foundryman could then calculate with some precision whether he could profitably employ a cheaper or more specialized alloy for any particular application. It is evident, for example, that if a foundry's sole product is to be low-pressure valves and fittings, it can save money by substituting a semi-red brass for the more expensive bronze. On the other hand, hit-or-miss substitution on a basis of per-pound cost only can lead to loss rather than profit.

In these articles on brass foundry alloys an attempt has been made to select and describe briefly a few compositions which would serve to illustrate the entire field of nonferrous foundry practice. Of the hundreds of alloys which are in use or have been described in the literature, those named are among the most important. One or more of them would be suitable for any requirement the foundryman might be called upon to meet. For the sake of simplification it has been necessary to omit some widely used alloys which, under some circumstances, might be more economical to use but whose properties do not differ greatly from those which were included. What is at best an exceedingly complex situation can perhaps be clarified somewhat by stripping it down to its essentials.

## Atlantic City Draws Foundrymen for . . .

# AFS CONGRESS and

**Heavy attendance seen for 60th annual convention of the American Foundrymen's Society. Extensive program of technical papers to be presented. Equipment and supplies exhibits to fill Convention Hall**

MODERN foundry techniques and the equipment and materials for carrying them out will be discussed and displayed at Atlantic City, N. J., from Thursday, May 3, through Wednesday, May 9.

For its 60th annual convention the American Foundrymen's Society has planned what promises to be an outstanding program. Visitors to the Congress and Show will find a wealth of information in the comprehensive technical papers to be presented. Of equal interest will be the extensive exhibit of equipment, supplies and services. Many new products will be included in the more than 250 displays which will tax the capacity of Atlantic City's huge Convention Hall. Additional details on the exhibits are presented on pages 170-173.

**Technical Program**—Convention Hall also will be the site of most technical sessions, in addition to being registration headquarters for the Congress and Show. Roundtable luncheons, dinners and some of the shop course sessions are scheduled for hotels. See pages 164-169 for the complete list of meetings.

Several changes have been made from former practice in scheduling the technical sessions. No more than four sessions will be held simultaneously; in the past there have been as many as six. Starting time of morning meetings has been advanced to 9 a.m., and most afternoon sessions will start at 2:30 p.m. This will provide more time than formerly for the roundtable luncheons. All technical sessions are scheduled for 2½ hours each, providing extra time for discussion.

*Sand Sessions*—A broad program is being sponsored by the Sand Division. It includes five technical sessions, two shop courses and a dinner. Among the subjects to be treated are sand testing, shell mold sands, new developments in core blowing, factors affecting casting surface finish, carbon dioxide hardening and use of coke as a molding medium.

*Gray Iron*—Four technical sessions, two shop courses and a luncheon make up the gray iron program. Discussion topics will include heat treatment, selection of melting materials, service life of iron castings, coke properties, and operation of hot blast, water-cooled and basic-lined cupolas.

*Malleable Iron*—Such topics as heat treating equipment, annealing practice, pearlitic malleable, welding and molding methods will be considered at two technical sessions, one shop course and a roundtable luncheon sponsored by the Malleable Division. The luncheon, a joint gray iron and malleable meeting, will have "Malleable Base Spheroidal Iron" as its discussion topic.

*Brass and Bronze* — Fluxing and deoxidation, casting defects, use of radiography and characteristics of copper-titanium alloys will be discussion subjects at three technical sessions and a luncheon.

*Light Metals*—Four technical sessions and one luncheon meeting of this division will cover centrifugal and die casting, gating principles, degassing methods and description of new aluminum and magnesium alloys.

*Steel*—Program for this division's three technical sessions and a luncheon meeting includes such subjects as deoxidation, hot tearing characteristics, sand problems, shell molding, gas removal and effect of bentonite on casting defects.

*Pattern*—Coatings for patterns, metal pattern equipment and use of epoxy resin patterns will be discussed at two technical sessions. Ralph L. Lee, Birmingham, Mich., will speak at a luncheon meeting.

Two technical sessions and a luncheon each are scheduled by the Education Division and the Industrial Engineering and Cost Committee. One

# EXHIBIT

## Non-Ferrous Founders' Society Meeting

ANNUAL meeting of the Non-Ferrous Founders' Society will be held at the Marlborough-Blenheim Hotel, Atlantic City, on Thursday, May 3, opening day of the AFS Congress.

A morning session at 9:30 a.m. will include annual reports of officers and committees. The membership will be asked for expressions on proposed research activities and comparative cost groups.

A management luncheon session under the cosponsorship of the society and the AFS will feature a panel of top-flight purchasing executives speaking on the subject "What a Buyer Expects from a Foundry."

At a 2:30 p.m. session, William A. Meissner, Copper Division, Business and Defense Services Administration, Washington, will discuss "What Is the Immediate Outlook for Nonferrous Metals?" A second subject, "How Comparisons of Operating Costs Will Benefit Our Industry," will be covered in a discussion led by William A. Gluntz, Gluntz Brass & Aluminum Foundry Co., Cleveland, and cost consultants.

Annual dinner meeting Thursday evening will be preceded by a cocktail hour at 6 p.m. Subject of the dinner speaker, Julius Kass, will be "How Zany Can They Get?"

The society also has scheduled meetings of its executive committee on May 1 and its board of directors on May 2, both at the Marlborough-Blenheim.

session will be devoted to refractories and two to heat transfer subjects.

Growing interest in noise control in foundries is reflected in the planning of a technical session and a luncheon meeting on this subject. The Safety, Hygiene and Air Pollution Control Committee also will hold a session on ventilation and safety and a management dinner meeting devoted to discussion of air pollution.

Metallography will receive more than usual attention during the Congress. Two evening sessions on this subject will cover both ferrous and nonferrous metallographic practice.

Several papers by foreign authors are expected to prove of interest. These include two German papers on hot-blast cupola operation, another German discussion of induction melting furnace practice in Europe, and the official exchange paper of the Institute of British Foundrymen on the carbon dioxide process. A paper from the British Cast Iron Research Association will discuss the relationship of blowholes in gray iron to manganese sulphide segregation.

*Research Work*—A session on study of fundamentals will have two papers dealing with metal flow. One will discuss metal solidification in a flowing stream; the other will describe a new method for measuring the fluidity of metals.

Among other research work to be described is a progress report on the study of temperature drop in pouring ladles—a project of the Heat Transfer Committee. The Sand Division's Mold Surface Committee will report on the influence of sand distribution and surface coatings on metal penetration. A joint committee of the AFS and the American Welding Society will discuss its study of the welding of malleable iron castings.

Several papers will be presented dealing with shell molding and coremaking. They include: "Some Considerations on the Tensile and Transverse Strength Testing of Shell Mold and Core Sands," "Cold Process for Resin-Coated Foundry Sands," "Inorganic Binders Solve Shell Molding Problems" and "Blow-Hot Press Automatic Shell Molding Machine."

**Annual Meeting**—Business meeting of the AFS is scheduled to follow a Saturday luncheon at the Traymore Hotel. National President Bruce L. Simpson, National Engineering Co., Chicago, will preside. In addition to the presentation of annual

## Charles Edgar Hoyt Memorial Lecture

"Marketing Your Product" is to be the title of the 1956 Charles Edgar Hoyt Memorial Lecture. The lecture will be presented by S. C. Massari, director of research, National Engineering Co., Chicago, at 1:30 p.m. Saturday, May 5, at the Traymore Hotel, Atlantic City, following the AFS annual business meeting luncheon.

Well known throughout the foundry industry, Mr. Massari was technical director of the AFS in 1946-1953 and the society's Whiting Gold Medal recipient in 1949. Graduated from Massachusetts Institute of Technology in 1924, he was chief metallurgist of the Association of Manufacturers of Chilled Car Wheels for 16 years. Mr. Massari was cited for outstanding wartime service as lieutenant colonel with the Chicago Ordnance District.

S. C. MASSARI

reports and of awards in the national apprentice contest, the meeting will include the election of officers and directors for the coming year. Following is the slate proposed by the society's Nominating Committee:

President—Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill., currently vice president; vice president—Harry W. Dietert, Harry W. Dietert Co., Detroit. Directors to serve three years—Alex W. Pirrie, foundry superintendent, Standard Sanitary & Dominion Radiator Ltd., Toronto; Roger W. Griswold, superintendent, foundry division, Erie Malleable Iron Co., Erie, Pa.; Gerald R. Rusk, president, Freeman Supply Co., Toledo, O.; R. V. Righter, plant manager, Central Foundry Division, General Motors Corp., Danville, Ill.; Garnet P. Phillips, general supervisor, foundry research, International Harvester Co., Chicago; Herbert Heaton, foundry superintendent, Letson & Burpee Ltd., Vancouver, B. C. As retiring president, Bruce L. Simpson will serve as a director for one year.

Following the annual meeting the Charles Edgar Hoyt Memorial Lecture will be presented by S. C. Massari, National Engineering Co., Chicago. His lecture, "Marketing Your Product," will emphasize the need for new product development by foundries and for close contact with customers. It will also explain how a foundry can develop a relatively inexpensive marketing study to suit its own requirements.

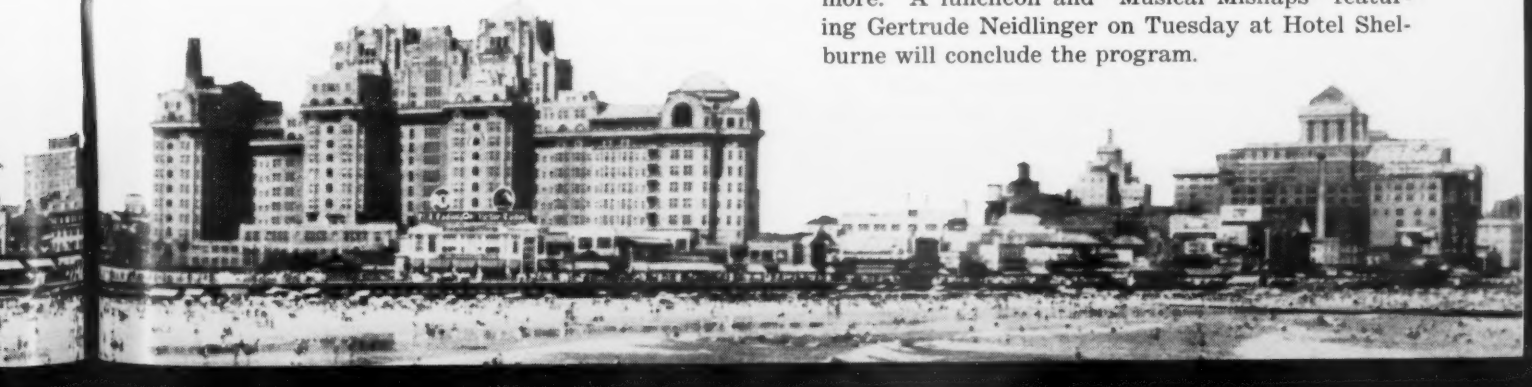
**Annual Banquet**—Friday evening's annual banquet at the Traymore Hotel will have Dr. Norman Vincent Peale as its guest speaker. Minister of the historic Marble Collegiate Church, New York, Dr. Peale is widely known as both an author and speaker. His subject will be "Efficiency Through Right Thinking."

The banquet also will be the occasion for the annual AFS awards of gold medals and life memberships. Six individuals have been chosen by the Board of Awards for the 1956 presentations. Their biographies appear on pages 174-175.

**Ladies Entertainment**—Ladies attending the Atlantic City convention will find an extensive program arranged for their entertainment. Registration headquarters will be maintained at the Sun Deck of Hotel Traymore during the hours of 9:30 a.m. to 4 p.m. on Thursday, Friday, Saturday and Monday and 9:30 to noon on Tuesday. Mrs. Bruce L. Simpson is honorary chairman of the entertainment committee, with Mrs. Frank W. Shipley and Mrs. Harry W. Dietert serving as co-chairmen. Assisting them as hostesses will be the wives of AFS board members.

The annual AFS tea will be held Thursday afternoon from 3 to 5 o'clock at the Hotel Claridge. Friday's program includes a morning art gallery tour and a visit to the Brighton Orchid Nursery, Linwood, N. J. The annual AFS banquet is scheduled for that evening.

A luncheon and fashion show has been arranged for Saturday noon at the Ritz-Carlton. Sunday will be an open day, and the program resumes on Monday with a talk and demonstration on fashions and flower arranging from 2 to 4:30 p.m. at the Traymore. A luncheon and "Musical Mishaps" featuring Gertrude Neidlinger on Tuesday at Hotel Shelburne will conclude the program.



# TECHNICAL PROGRAM

## THURSDAY, MAY 3

**8:30-5:30—Registration.**

**9:00-5:30—Exhibits open.**

**12 noon—Authors' luncheon** (Shelburne Hotel)

**2:30 p.m.—Gray Iron Session** (Convention Hall)

*Service Life of Iron Castings Can Be Affected by Their Thermal Conductivity*—J. A. Davis, H. W. Deem, and H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, O.

*The Stress-Strain Relationship for Gray Iron*—E. M. Stein, Battelle Memorial Institute, Columbus, O.

*Cracking and Life of Ingot-Molds*—J. Duflot, Institut de Recherches de Siderurgie, St.-Germain-en-Laye, France.

**2:30 p.m.—Malleable Session** (Convention Hall)

*Progress Report,* Malleable Division Research Committee—R. W. Heine, University of Wisconsin, Madison, Wis.

*Annealing on Five-Day Week Basis*—R. V. Righter, Central Foundry Div., General Motors Corp., Danville, Ill.

*Consideration of Factors Governing Selection of Modern Malleable Heat Treating Equipment*—Panel discussion by Controlled Annealing Committee. Fred Jacobs, chairman, Texas Foundries Inc., Lufkin, Tex.

**2:30 p.m.—Sand Session** (Convention Hall)

*Evaluating Cereal Core Binders*—E. C. Zuppann and H. Pitz, Oliver Corp., South Bend, Ind.

*Some Considerations on the Tensile and Transverse Strength Testing of Shell Mold and Core Sands*—P. J. Ahearn and F. Quigley, Watertown Arsenal, Watertown, Mass., and J. I. Bluhm and J. F. Wallace, Case Institute of Technology, Cleveland.

*Some Observations on the Transverse Test at Elevated Temperatures for Molded Sand Mixtures*—D. C. Williams, Ohio State University, Columbus, O.

**2:30 p.m.—Brass & Bronze Session** (Convention Hall)

*Fluxing and Deoxidization Treatment for Copper*—M. G. Neu, Foundry Services (Overseas) Ltd.,

Birmingham, England, and J. E. Gotheridge, Foundry Services Inc., Columbus, O.

*Gas Porosity in Oxygen-Free Copper Castings*—D. V. Ragone, University of Michigan; J. K. Sprinkle, Virginia Polytechnic Institute; H. F. Taylor and C. M. Adams, Massachusetts Institute of Technology.

**8 p.m.—Gray Iron Shop Course** (Traymore Hotel)
Subject: *Cupola Operation.* Speakers: Sam F. Carter, American Cast Iron Pipe Co., Birmingham, Ala.—"Basic Cupola Operation." M. H. Horton, Deere & Co., Moline, Ill.—"Water-Cooled Cupola Operation." H. E. Henderson, Lynchburg Foundry Co., Lynchburg, Va.—"Acid Cupola Operation with Water-Cooled Tuyeres and Hot Blast."

## FRIDAY, MAY 4

**7:30 a.m.—Authors' breakfast** (Shelburne Hotel)

**8:30-5:30—Registration.**

**9:00-5:30—Exhibits open.**

**9:00 a.m.—Brass & Bronze Session** (Convention Hall)
*Age-Hardening Characteristics of a Cast Alloy of Copper—5.8% Titanium*—N. P. Hehner, H. McCurdy, and R. E. Edelman, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia.
*Application of Radiography in Manufacture of Bronze Castings*—N. A. Kahn, S. Goldspiel, and R. R. Waltien, New York Naval Shipyard, Brooklyn, N. Y.

**9:00 a.m.—Gray Iron Session** (Convention Hall)
(Sponsored by Cupola Research Committee)
*Hot-Blast Cupola Practice*—W. L. Heinrichs, Fried. Krupp, Essen-Bredeney, Germany.
*Development of Hot-Blast Cupola Melting Technique in Europe*—Ernst Loebbecke, W. Strikfelt & Co., Rhineland, Germany.

**9:00 a.m.—Malleable Session** (Convention Hall)
*Comparison of Liquid and Air-Quenched Pearlitic Malleable Irons*—(Report of Pearlitic Malleable Committee) R. W. Heine, Chairman, University of Wisconsin, Madison, Wis.
*Welding of Castings*—(Report of Joint Committee of AFS and American Welding Society)
*The Nucleation of Graphite During the Decomposition of Cementite*—E. G. Haney, Aluminum Co. of America, New Kensington, Pa., M. F. Hawkes, Naval Ammunition Dept., Oahu, T. H.

**9.00 a.m.—Pattern Session** (Convention Hall)
*Use of Epoxy Resin as Pattern Material*—E. J. McAfee, Puget Sound Naval Shipyard, Bremerton, Wash.
*Coatings for Wood and Metal Patterns*—John Thompson, the Sherwin-Williams Co., Cleveland.

**12 noon—Joint Malleable and Gray Iron Roundtable Luncheon** (Traymore Hotel)
*Malleable Base Spheroidal Iron*—F. B. Rote, E. J. Chojnowski, and J. F. Bryce, Albion Malleable Iron Co., Albion, Mich.

**12 noon—Brass & Bronze Roundtable Luncheon** (Traymore Hotel)
Subject: *New Horizons in Copper-Base Alloy Founding.*

**12 noon—Education Division Roundtable Luncheon** (Shelburne Hotel)
Subject: *Tomorrow's Foundryman.* Speaker: L. J. Fletcher, Caterpillar Tractor Co., Peoria, Ill.

**2:30 p.m.—Light Metals Session** (Convention Hall)
*Centrifugal Casting of Unusual Shapes in Nonferrous Alloys*—J. P. Krishon, Centr-O-Cast & Engineering Co., Detroit.
*Machinability of Aluminum Die Castings*—D. L. Colwell and Oldrich Tichy, Apex Smelting Co., Cleveland.
*Novel Aluminum Engine Die Castings*—E. N. Jacobi, Briggs & Stratton Corp., Milwaukee.

**2:30 p.m.—Plant and Plant Equipment Session** (Convention Hall)
*Method of Melting Malleable Iron with Combination of Pulverized Coal and Oil*—E. H. Nielsen, Whiting Corp., Harvey, Ill.
*Recent Development of Coreless Line Frequency Induction Melting Furnace in European Foundries*—Otto Junker, Otto Junker GMBH, Lammersdorf, Aachen, Germany. (Presented by Manuel Tama, Ajax Engineering Corp., Trenton, N. J.)

**2:30 p.m.—Sand Session** (Convention Hall)
*Molding Sands, Molding Methods, and Casting Dimensions*—R. W. Heine, University of Wisconsin, Madison, Wis.
*Does Sand Testing Give Us the Facts?*—R. W. Heine, University of Wisconsin; E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati.
*Jolt Test for Sand*—R. W. Heine, University of Wisconsin, E. H. King and J. S. Schumacher, Hill & Griffith Co., Cincinnati.

**2:30 p.m.—Gray Iron Shop Course** (Convention Hall)
Subject: *Selection of Materials for Gray Iron Melting.* Speaker: R. A. Clark, Electro Metallurgical Corp., Div. Union Carbide & Carbon Co.

**7:30 p.m.—AFS Annual Banquet** (Traymore Hotel)

## SPECIAL EVENTS AT ATLANTIC CITY

### LUNCHEONS

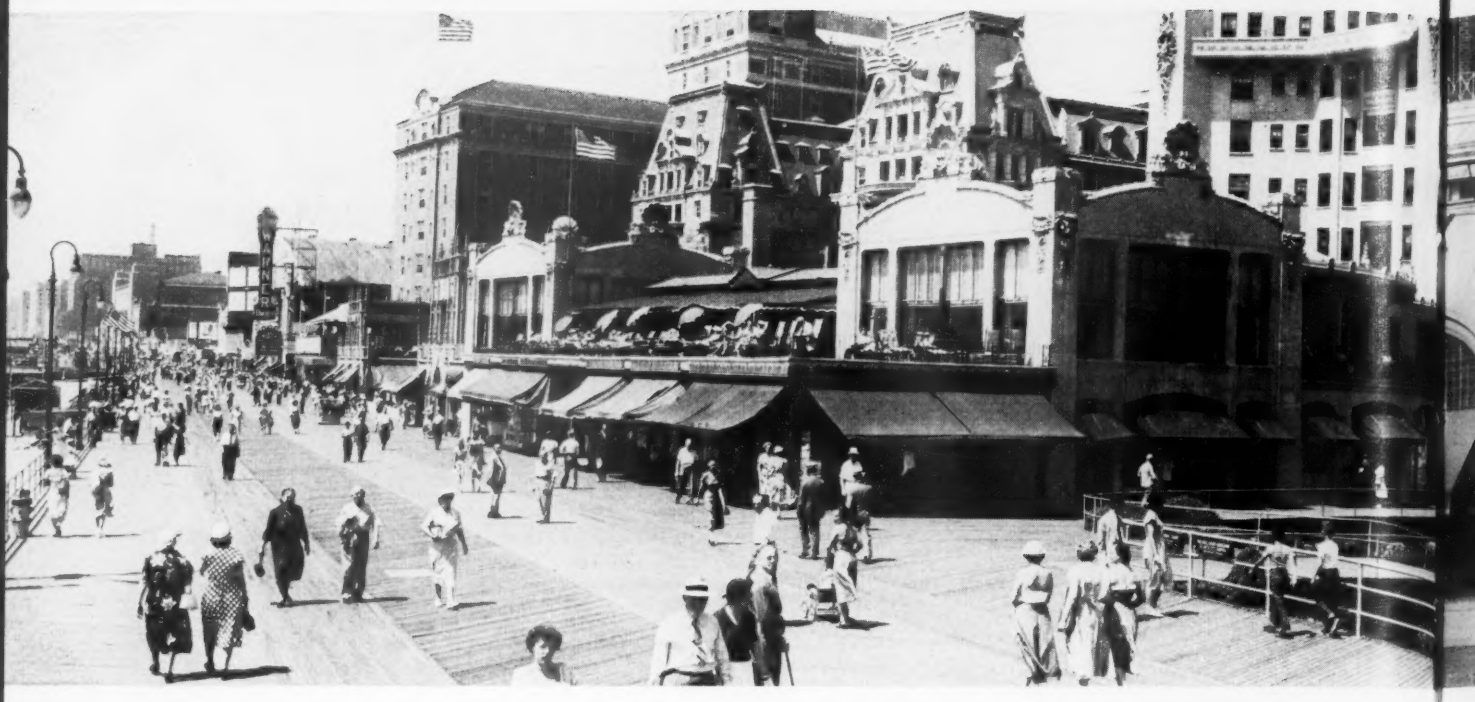
Friday, May 4—Malleable and Gray Iron: "Malleable Base Spheroidal Iron."
Brass and Bronze: "New Horizons in Copper-Base Alloy Founding."
Education: "Tomorrow's Foundryman."
Saturday, May 5—Annual business meeting and Charles Edgar Hoyt Memorial Lecture.
Monday, May 7—Light Metals: "Gas in Light Alloys."
Tuesday, May 8—Pattern: "Patternmaking—Man to Man."
Industrial Engineering: "Human Factor in New Equipment."
Wednesday, May 9—Steel: "What's New with Snottters and Other Steel Foundry Problems."

### DINNERS

Friday, May 4—Annual banquet and awarding of AFS gold medals and honorary life memberships. Principal speaker, Dr. Norman Vincent Peale: "Efficiency Through Right Thinking."
Saturday, May 5—Sand: "New Developments in Core Blowing."
Sunday, May 6—Canadian dinner.
Tuesday, May 8—Management: "Air Pollution, a Community Relations Problem."

### SHOP COURSES

Thursday, May 3, 8 p.m.—Gray Iron: "Cupola Operation."
Friday, May 4, 2:30 p.m.—Gray Iron: "Selection of Materials for Gray Iron Melting."
Saturday, May 5, 3 p.m.—Malleable: "Molding Methods for Malleable Iron."
Monday, May 7, 8 p.m.—Sand: Panel Discussion.
Tuesday, May 8, 8 p.m.—Sand: Panel Discussion.



Presentation of AFS Gold Medal Awards and Honorary Life Memberships.
Subject: *Efficiency Through Right Thinking.* Guest Speaker: Dr. Norman Vincent Peale.

## SATURDAY, MAY 5

**7:30 a.m.—Authors' Breakfast** (Shelburne Hotel)

**8:30-5:30—Registration.**

**9:00 a.m.—Exhibits Open. Exhibit Hours: 9:00-12:00, 2:00-5:30.**

**9:00 a.m.—Education Session.** (Convention Hall)
Subject: *Training Needs for the Foundry Industry.*

**9:00 a.m.—Refractories Session** (Convention Hall)
*Properties of Refractories Affect Air-Furnace Bottom Service*—C. C. Lawson and L. R. Jenkins, Wagner Malleable Iron Co., Decatur, Ill.
*Experiences with Basic Cupola Refractories and Melting*—A. P. Alexander and Edw. Boywid, International Harvester Co., Memphis, Tenn.

**9:00 a.m.—Light Metals Session** (Convention Hall)
*Tensile Properties of Aluminum Silicon Magnesium Alloys and the Effects of Sodium Modification*—R. C. Harris, S. Lipson, and H. Rosenthal, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia.
*An Evaluation of ZH62XA Magnesium Sand Casting Alloy*—K. E. Nelson, Dow Chemical Co., Midland, Mich., and W. P. Saunders, Dow Chemical Co., Madison, Ill.
*Effects of Section Size Variations in a Test Casting on Properties of Some Mg-Al-Zn Alloys*—W. E. Pearson, Dow Chemical Co., Midland, Mich.

**9:00 a.m.—Sand Session** (Convention Hall)
*Cold Process for Resin-Coated Foundry Sands*—J. E. Bolt, General Electric Co., Pittsfield, Mass.
*Preliminary Evaluation of Fluid Coke as a New Molding Medium*—G. R. Meyers and E. G. Gentry, Penola Oil Co., Detroit.

**12:00 noon—AFS Annual Business Meeting Luncheon** (Traymore Hotel)
Apprentice contest awards. Election of officers and directors.

**1:30 p.m.—Charles Edgar Hoyt Memorial Lecture** (Traymore Hotel)
Subject: *Marketing Your Product.* Speaker: S. C. Massari, National Engineering Co., Chicago.

**3:00 p.m.—Brass & Bronze Session** (Convention Hall)
*Casting Defects Clinic.*

**3:00 p.m.—Industrial Engineering Session** (Convention Hall)
*Practical Foundry Application of Statistical Quality Control*—Ross Martin Jr., Rich Mfg. Co. of Calif., Los Angeles.
*Engineering, Cost and Quality*—J. M. Barrabee, International Harvester Co., Milwaukee.

**3:00 p.m.—Malleable Shop Course** (Convention Hall)
Subject: *Molding Methods for Malleable Iron.*
*Green Sand Molding*—W. Tragarz, International Harvester Co., Chicago.
*Dry Core Sand Method*—R. H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich.
*Mold Blowing*—Medie Hakeman, John Deere Malleable Works, East Moline, Ill.
*High-Pressure Molding*—T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago.
*Shell Molding*—C. F. Joseph, Central Foundry Div., General Motors Corp., Saginaw, Mich.

**7:00 p.m.—Sand Division Dinner** (Traymore Hotel)
Subject: *New Developments in Core Blowing.*
Speaker: Arthur M. Clark, Ford Motor Co., Detroit.

## SUNDAY, MAY 6

**Registration and Exhibits Closed**

**7:30 p.m.—Canadian Dinner** (Traymore Hotel)

## MONDAY, MAY 7

**7:30 a.m.—Authors' Breakfast** (Shelburne Hotel)

**8:30-5:30—Registration.**

**9:00-5:30—Exhibits open.**

**9:00 a.m.—Light Metals Session** (Convention Hall)
*Modifications in Vertical Gating Principles*—K. R. Grube, R. M. Lang, and J. G. Kura, Battelle Memorial Institute, Columbus, O.
*New Aluminum Permanent Mold Casting Alloys C355 and A356*—R. C. Lemon and H. Y. Hunsicker, Aluminum Co. of America, Cleveland.
*New Aluminum Casting Alloy XA140 for Elevated*

*Temperature Applications*—R. C. Lemon and W. E. Sicha, Aluminum Co. of America, Cleveland.

**9:00 a.m.—Steel Session** (Convention Hall)

*Effects of Aluminum and Titanium Deoxidation on Cast Steel*—R. D. Ahles, W. R. Nestle, C. H. Weight, and R. S. Zeno, General Electric Co., Schenectady, N. Y.

*Hot Tearing Characteristics of Acid and Basic Steel Castings Determined by High Temperature Testing*—C. F. Christopher, Continental Foundry & Machine Div., Blaw-Knox Co., East Chicago, Ind.

**9:00 a.m.—Sand Session** (Convention Hall)

*Green Sand Casting Finish*—R. F. Meader, Whitin Machine Works, Whitinsville, Mass.

*Statistical Techniques for Classifying Foundry Sands*—D. C. Ekey and John Leaman, Lebanon Steel Foundry, Lebanon, Pa.

*Analysis of Factors Affecting Surface Finish of Gray Iron Castings*—D. C. Ekey and R. L. Yard, Lebanon Steel Foundry, Lebanon, Pa.

**9:00 a.m.—Joint Plant & Plant Equipment and Air Pollution Sessions** (Convention Hall)

*Available Control Equipment for the Foundry Cupola*—John M. Kane, American Air Filter Co., Louisville.

*Fuel Savings Through Proper Use of Make-up Air*—(Slide Demonstration)—K. E. Robinson, General Motors Corp., Detroit.

**12 noon—Light Metals Roundtable Luncheon** (Ambassador Hotel)

Subject: *Gas in Light Alloys.* Panel Members and Topics: *Methods and Apparatus for Measuring Gas Content of Melts*—H. Rosenthal, Pitman-Dunn Laboratories, Frankford Arsenal, Philadelphia.

*Application of Degassing Methods to Production*—W. A. Mader, Oberdorfer Foundries, Inc., Syracuse, N. Y.

*Production Results and Casting Quality*—B. J. Alperin, General Electric Co., Erie, Pa.

**2:30 p.m.—Heat Transfer Session** (Convention Hall)

*Temperature Drop in Pouring Ladles*—V. Paschkis, Columbia University, New York (Progress report on AFS-sponsored research work)

*The Risering of Nodular Iron. Part III—The Effect of Pouring Temperature on Shrink Depth*—R. C. Shnay and S. L. Gertsman, Dept. of Mines and Technical Surveys, Ottawa, Ont.

**2:30 p.m.—Gray Iron Session** (Convention Hall)

*Influence of Temperature on Mechanical Strength of Coke*—John Varga, Jr. and H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, O.

*Use of Pig Iron in Iron Foundries (with Particular Attention to Specifications, Costs, Residual Elements, and "Heredity")*—H. W. Lownie, Jr., Battelle Memorial Institute, Columbus, O.

*Compressive Strength of Coke*—D. E. Krause and E. A. Lange, Gray Iron Research Institute, Columbus, O.

**2:30 p.m.—Sand Session** (Convention Hall)

*The Carbon Dioxide Process* (Official Exchange Paper of The Institute of British Foundrymen)—D. V. Atterton, Foundry Services Ltd., England.

*Coremaking with $CO_2$ Process*—F. M. Scaggs, Oklahoma Steel Castings Co., Tulsa, Okla.

*Progress Report of Core Test Committee.*

**2:30 p.m.—Education Session** (Convention Hall)

Subject: *Chapter Educational Activities.* Speaker: H. E. Gravlin, Claude B. Schneible Co., Detroit.

Panel Discussion—"Responsibilities of Chapter Educational Chairman."

**8:00 p.m.—Metallography for the Foundryman (Part I)** (Traymore Hotel)

*Good Metallographic Practice*—A. M. Montgomery, Aluminum Co. of America, Cleveland.

*Metallography of Aluminum and Its Alloys*—Dr. Lucio F. Mondolfo, Armour Research Foundation, Chicago.

*Metallography of Magnesium and Its Alloys*—M. E. Brooks, Dow Chemical Co., Bay City, Mich.

**8:00 p.m.—Sand Shop Course** (Claridge Hotel)

Panel Members: H. W. Meyer, General Steel Castings Corp., Granite City, Ill.; H. F. Taylor, Massachusetts Institute of Technology; R. F. Meader, Whitin Machine Works, Whitinsville, Mass.. W. G. Parker, General Electric Co., Elmira, N. Y.

Moderator: Clyde Sanders, American Colloid Co., Chicago. Subject: *What Sand Mixture Should I Use?*

## TUESDAY, MAY 8

**7:30 a.m.—Authors' breakfast** (Shelburne Hotel)

**8:30-5:30—Registration.**

**9:00-5:30—Exhibits open.**

**9:00 a.m.—Heat Transfer Session** (Convention Hall)

Heat Transfer Fundamentals:
*Heat Flow in the Transient State*—V. Paschkis, Columbia University, New York.
*Solidification Phenomena*—W. S. Pellini, Naval Research Laboratory, Washington, D. C.
*Heat Treating Fundamentals*—W. J. Childs, Lafayette College, Easton, Pa.

**9:00 a.m.—Industrial Engineering Session** (Convention Hall)
*Basic Cost Concepts for the Small-Medium Foundry*—A. C. Sinnett, Terre Haute Malleable & Mfg. Co., Terre Haute, Ind.
*Incentives in a Small Jobbing Foundry*—C. C. Erhart, Jr., Chris Erhart Foundry & Machine Co., Cincinnati.

**9:00 a.m.—Pattern Session** (Convention Hall)
Subject: *Metal Pattern Equipment.*
Speaker: O. C. Bueg, Arrow Pattern & Engineering Co., Erie, Pa.

**9:00 a.m.—Gray Iron Session** (Convention Hall)
*Sub-Surface Blowholes in Gray Irons and Their Association with Manganese Sulphide Segregation*—W. G. Tonks, British Cast Iron Research Association, Birmingham, England.
*Heat Treatment of Gray Cast Iron*—J. B. Peck and A. H. Rauch, Deere & Co., Moline, Ill.

**12 noon—Noise Control Roundtable Luncheon** (Shelburne Hotel)
(Sponsored by Safety, Hygiene and Air Pollution Control Committee)
Subject: *Legal Aspects of the Noise Problem.* Speaker: F. E. Frazier, National Association of Mutual Casualty Cos., Chicago.

**12 noon—Pattern Roundtable Luncheon** (Ambassador Hotel)
Subject: *Patternmaking—Man to Man.* Speaker: Dr. Ralph L. Lee, Lee Hobby Foundry, Birmingham, Mich.

**12 noon—Industrial Engineering Roundtable Luncheon** (Traymore Hotel)
Subject: *The Human Factor in New Equipment.* Speaker: John Taylor, Norris & Elliott Inc., Columbus, O.

**2:30 p.m.—Fundamental Papers Session** (Convention Hall)
*Metal Solidification in a Flowing Stream*—M. C. Flemings, Massachusetts Institute of Technology, Cambridge, Mass.; Dr. E. E. Hucke, University of Michigan, Ann Arbor, Mich.; C. M. Adams, Jr., Massachusetts Institute of Technology.
*A New Method for Measuring the Fluidity of Metals*—D. V. Ragone, University of Michigan, Ann Arbor, Mich.; C. M. Adams, Jr. and H. F. Taylor, Massachusetts Institute of Technology.

**2:30 p.m.—Steel Session** (Convention Hall)
*Eliminate Grinding, Lower Costs of Cleaning Operations*—F. Newberry, Oklahoma Steel Castings Co., Tulsa, Okla.
*Inorganic Binders Solve Shell Molding Problems*—Jose Navarro and H. F. Taylor, Massachusetts Institute of Technology.
*Anionic or Cationic Agents—A Solution to Sand Problems*—G. J. Vingas and A. H. Lewis, Dominion Engineering Works, Montreal, Que.

**2:30 p.m.—Noise Control Session** (Convention Hall) (Sponsored by Safety, Hygiene and Air Pollution Control Committee)
*Foundry Noise Control*—A Demonstration—F. A. Patty, General Motors Corp., Detroit.
*Typical Foundry Noise Exposures*—Edward G. Meiter, Employers Mutual Liability Insurance Co. of Wis., Milwaukee, Wis.
*The Mechanics of Hearing and Hearing Loss in Noise Deafness*—Abraham I. Goldner, M.D., D.O.L., Flushing, N. Y.
Panel Discussion—Short Case Histories in Foundry Noise Control: A. L. Cudworth, Liberty Mutual Insurance Co., Boston; James Botsford, Bethlehem Steel Co., Bethlehem, Pa.; E. L. Lund and W. O. Hanson, Allis-Chalmers Mfg. Co., La Crosse, Wis.

**7:00 p.m.—Management Dinner** (Traymore Hotel)

Subject: *Air Pollution, a Community Relations Problem.* Speaker: Dr. E. M. Adams, Dow Chemical Co., Midland, Mich.

**8:00 p.m.—Metallography for the Foundryman (Part II)**—(Traymore Hotel)

*Ferrous Metalographic Practice*—P. C. Rosenthal, University of Wisconsin, Madison, Wis.

*Metallography of Copper and Nickel-Base Alloys and Stainless Steels*—J. J. Connelly, American Brake Shoe Co., Mahwah, N. J.

*Management of a Metallographic Laboratory*—Walter W. Edens, Allis-Chalmers Mfg. Co., Milwaukee.

**8:00 p.m.—Sand Shop Course** (Claridge Hotel)

Panel Members: Ray Olson, Production Pattern & Foundry Co., Chicopee, Mass.; Charles W. Mooney Jr., Olney Foundry Div., Link Belt Co., Philadelphia. Moderator: Clyde Sanders, American Coloid Co., Chicago. Subject: *Eliminating Sand Pile Blues.*

## WEDNESDAY, MAY 9

**7:30 a.m.—Authors' breakfast** (Shelburne Hotel)

**8:30-3:00—Registration.**

**9:00-5:30—Exhibits open.**

**9:00 a.m.—Joint Gray Iron & Plant and Plant Equipment Session** (Convention Hall)

*Casting Tolerances as Affected by Automation in the Machine Shop*—E. L. Buchman, Ford Motor Co., Berea, O.

*Blow-Hot Press Automatic Shell Molding Machine*—R. S. Amala, J. H. Smith, A. L. Boegehold, and R. F. Thomson, General Motors Corp., Detroit.

Motion Picture: *Techniques for Tomorrow.* (Various Automation Innovations in Ford's Cleveland Foundry.)

**9:00 a.m.—Steel Session** (Convention Hall)

*Bentonite—Properties and Composition (Their Relation to Casting Defects)*—W. D. Emmett, Los Angeles Steel Casting Co., Los Angeles.

*Removal of Gases from Molten Steel*—Clyde H. Wyman, Burnside Steel Foundry Co., Chicago.

*Ceramicast Process for Steel Castings*—D. C. Ekey and E. G. Vogel, Lebanon Steel Foundry, Lebanon, Pa.

**9:00 a.m.—Sand Session** (Convention Hall)

*Influence of Sand Distribution and Surface Coatings on Metal Penetration*—Report by Sand Division Mold Surface Committee—8-H.

*Casting Finish, Precision and Tolerance*—C. A. Sanders, American Colloid Co., Chicago.

**9:00 a.m.—Ventilation and Safety Session** (Convention Hall)

Subject: *Foundry Ventilation.* Speaker: J. G. Liskow, American Air Filter Co., Louisville. Subject: *Aluminum Therapy.* Speaker: Dr. J. W. G. Hannon, McIntyre Research Foundation, Washington, Pa.

English Motion Pictures—*Ventilation.*

Subject: *AFS Safety Training Course.* Speaker: R. A. Oster, Beloit Vocational and Adult School, Beloit, Wis.

**12 noon—Steel Roundtable Luncheon** (Ambassador Hotel)

Subject: *What's New with Snotters and Other Steel Foundry Problems.* Presiding, Dale Hall, Oklahoma Steel Castings Co., Tulsa.

**5:30 p.m.—Congress and Exhibit Officially Closes.**

# FOUNDRY SHOW

MANY new or improved products will be shown by manufacturers of foundry equipment and supplies at Atlantic City, May 3-9. In view of the heavy demand for exhibit space, this biennial show conducted by the American Foundrymen's Society appears certain to rival any of the past exhibits both in size of the area given over to the displays and in the variety of products available for inspection.

A number of operating exhibits are planned, including practical demonstrations of the carbon dioxide hardening and shell molding processes.

For brief descriptions of some of the exhibit features, see "New Equipment and Supplies," starting on page 342. It includes items on many of the new pieces of equipment the show visitor will see at Convention Hall.

While the AFS Congress and Exhibit starts Thursday morning, May 3 and closes Wednesday afternoon, May 9, both the show and technical sessions will be suspended on Sunday, May 6. Also, the exhibits will be closed in the evenings. Open hours for the various days are:

Thursday and Friday, May 3 and 4—9 a.m. to 5:30 p.m.; Saturday, May 5—9 a.m. to 12 noon and 2 to 5:30 p.m.; Monday, Tuesday and Wednesday, May 7, 8 and 9—9 a.m. to 5:30 p.m.

Registration fees for the Congress and Show are $2 for AFS members, $5 for nonmembers. One exception will be on Saturday, May 5—Atlantic Coast Day—when registrants will be admitted free.

## LIST OF EXHIBITORS and BOOTH NUMBERS

*(Corrected to Apr. 12)*

AFS Headquarters Office ..... Lobby
A. I. C. Engineering Co., Indianapolis ..... 137
Acme Resin Corp., Forest Park, Ill. ..... 1305
Adams Co., Dubuque, Iowa ..... 808-10
Air Reduction Sales Co., New York ..... 902
Ajax Electrothermic Corp., Trenton, N. J. ..... 1418
Ajax Engineering Corp., Trenton, N. J. ..... 1420
Ajax Flexible Coupling Co., Westfield, N. Y. ..... 1840
Ajax Metal Div., H. Kramer & Co., Chicago ..... 303-05
Allen Industrial Products Inc., Battle Creek, Mich. ..... 1946
Allis-Chalmers Mfg. Co., Milwaukee ..... 1737-39
Alloy Metal Abrasive Co., Ann Arbor, Mich. ..... 203
Alpha-Lux Co., New York ..... 136
American Air Filter Co., Louisville ..... 1309-11
American Alloys Corp., Kansas City, Mo. ..... 1902
American Colloid Co., Chicago ..... 912
American Cystoscope Makers Inc., New York ..... 123
American Gas Association, New York ..... 211
*American Metal Market*, New York ..... 237
American Refractories & Crucible Corp., North Haven, Conn. ..... 328
American Steel Abrasives Co., Galion, O. ..... 1829
Apex Smelting Co., Chicago ..... 1413
Arcair Co., Lancaster, O. ..... 439
Archer-Daniels-Midland Co., Cleveland ..... 1636-38
Austin-Western Works, Baldwin-Lima-Hamilton Corp., Aurora, Ill. ..... 1943
*Automation*, Cleveland ..... 1521
Ayers Mineral Co., Zanesville, O. ..... 312

Baird Associates Inc., Cambridge, Mass. ..... 1835
Baroid Div., National Lead Co., Chicago ..... 208
Barrett Div., Allied Chemical & Dye Corp., New York ..... 1944A
C. O. Bartlett & Snow Co., Cleveland ..... 1722-26
Beardsley & Piper Div., Pettibone-Mulliken Corp., Chicago ..... 603-504, 503-416, 507-420, 509-422, 607-506, 609-508
Beryllium Corp., Reading, Pa. ..... 340
Black, Sivalls & Bryson Inc., Kansas City, Mo. ..... 209
Blastcrete Service Co., Los Angeles ..... 112
Blaw-Knox Equipment Div., Blaw-Knox Co., Pittsburgh ..... 1910
Borden Co., Chemical Div., New York ..... 1914-16
Brush Beryllium Co., Cleveland ..... 301
Budd Co., Philadelphia ..... 1337-39

C & S Products Co., Detroit ..... 1944B
Campbell-Hausfeld Co., Harrison, O. ..... 2101-03
Canton Chaplet & Chill Div., W. L. Jenkins Co., Canton, O. ..... 1303
Carborundum Co., Niagara Falls, N. Y. ..... 1942
Carrier Conveyor Corp., Louisville ..... 1341-43
Carver Foundry Products Co., Muscatine, Iowa ..... 1318
Castings Potential Project Exhibit—U. S. Air Force, Alloy Engineering & Casting Co., Champaign, Ill. ..... 2002-06
Central Foundry Div., General Motors Corp., Saginaw, Mich. ..... 2108
Centrifugal Castings Machine Co., Tulsa, Okla. ..... 302
Cerro de Pasco Corp., New York ..... 132-34
Chain-Belt Co., Milwaukee ..... 110
Clark Equipment Co., Construction Machinery Div., Benton Harbor, Mich. ..... 1340-1439
Clayton Sherman Abrasive Co., Detroit ..... 1829
Clearfield Machine Co., Clearfield, Pa. ..... 703
Cleco Div., Reed Roller Bit Co., Houston, Tex. ..... 709-11
Cleveland Flux Co., Cleveland ..... 1728-30
Cleveland Metal Abrasive Co., Cleveland ..... 1842
Cleveland Vibrator Co., Cleveland ..... 423
Climax Molybdenum Co., New York ..... 602-701
Colonial Metals Co., Columbia, Pa. ..... 336
Corn Products Sales Co., New York ..... 702-801
Corning Glass Works, Corning, N. Y. ..... 1912

Davenport Machine & Foundry Co., Davenport, Iowa ..... 1945-47
Davey Compressor Co., Kent, O. ..... 307
Dayton Oil Co., Dayton, O. ..... 1001
Debevoise-Anderson Co., New York ..... 236-337
Delhi Foundry Sand Co., Cincinnati ..... 1114
Delta Oil Products Co., Milwaukee ..... 1525
Wm. Demmler & Bros., Kewanee, Ill. ..... 1425
Detroit Electric Furnace Div., Kuhlman Electric Co., Bay City, Mich. ..... 1920
Harry W. Dietert Co., Detroit ..... 1527

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Joseph Dixon Crucible Co., Jersey City, N. J. 222
Dodge Steel Co., Philadelphia 201
Durez Plastics Div., Hooker Electrochemical Co., Tonawanda, N. Y. 218

Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago 1822-26
Eastman Kodak Co., X-Ray Div., Rochester, N. Y. 401
Eclipse Fuel Engineering Co., Rockford, Ill. 910
Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., New York 1635-43
Electro Refractories & Abrasives Corp., Buffalo 1426
Charles Engelhard Inc., East Newark, N. J. 2003
Exomet Inc., Conneaut, O. 332

Fabreeka Products Co., Boston 1428
Fanner Mfg. Co., Cleveland 417
Federal Foundry Supply Co., Cleveland 1346-48
Federated Metals Div., American Smelting & Refining Co., New York 903-09
FOUNDRY, Cleveland 1521
Foundry Educational Foundation, Cleveland 105-07
Foundry Equipment Co., Cleveland 1415-19
Foundry Equipment Manufacturers Association, Washington 1104
Foundry Facings Manufacturers Association, Pittsburgh 2013
Foundry Flask & Equipment Co., Northville, Mich. 2114
Foundry Services Inc., Columbus, O. 1906-08
Fox Grinders Inc., Pittsburgh 1112
Foxboro Co., Foxboro, Mass. 906
Freeman Supply Co., Toledo, O. 1328-30

General Electric Co., Pittsfield, Mass. 1924-26
General Refractories Co., Philadelphia 1327
Girdler Co., Thermex Div. of National Cylinder Gas Co., Louisville 1329-33
Globe Steel Abrasive Co., Mansfield, O. 1829
Daniel Goff Co. & Jesse T. Morie & Son, Mauricetown, N. J. 103
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Great Lakes Carbon Corp., New York 1128
Great Lakes Foundry Sand Co., Detroit 1812
A. P. Green Fire Brick Co., Mexico, Mo. 207
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E. S. Harman Corp., Chicago 421
Benj. Harris & Co., Chicago Heights, Ill. 1828
Harrison Machine Co., Erie, Pa. 1321
Haylco Controls Co., Neenah, Wis. 104-06
Herman Pneumatic Machine Co., Pittsburgh 1642-1743
Hewitt-Robins Inc., Stamford, Conn. 1738
Hickman, Williams & Co., New York 403-05
Hickory Specialty Co., & Specialty Products Co., Jersey City, N. J. 1736B
Hill & Griffith Co., Cincinnati 429-33
Hines Flask Co., Cleveland 1818
Robt. W. Hoffman Co., Chicago 2007
Frank G. Hough Co., Libertyville, Ill. 1923-27
E. F. Houghton & Co., Philadelphia 415
Houghton Laboratories, Pittsburgh 2112
Hydro-Blast Corp., Franklin Park, Ill. 1438

International Graphite & Electrode Div., Speer Carbon Co., St. Marys, Pa. 231-233
International Molding Machine Co., La Grange Park, Ill. 1422
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Ironton Fire Brick Co., Ironton, O. 1536B

Jarrell-Ash Co., Newtonville, Mass. 202
Jeffrey Mfg. Co., Columbus, O. 1814-16
Jersey State Chemical Co., Haledon, N. J. 1441
Kaiser Aluminum & Chemical Sales, Kaiser Chemicals Div., Oakland, Calif. 1124
Kindt-Collins Co., Cleveland 1830
King Tester Corp., Philadelphia 441
Lester B. Knight & Associates, Chicago 606-08
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Laboratory Equipment Corp., St. Joseph, Mich. 205
Laclede-Christy Co., Div. of H. K. Porter Co., St. Louis 338
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Lava Crucible-Refractories Co., Pittsburgh 601
R. Lavin & Sons Inc., Chicago 1928-30
Lectromelt Furnace Co., Div. of McGraw Electric Co., Pittsburgh 1003-05
Lindberg Engineering Co., Chicago 1430-1529
Linde Air Products Co., Division of Union Carbide & Carbon Corp., New York 1635-43
Link-Belt Co., Chicago 1434-36, 1535-37
Liquid Carbonic Corp., Chicago 2117
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*Machine Design*, Cleveland 1521
Magie Bros. Oil Co., Franklin Park, Ill. 806
Magnaflux Corp., Chicago 1837
Manley Sand Co., Rockton, Ill. 1130
Markal Co., Chicago 308-10, 407
Martin Engineering Co., Neponset, Ill. 1310
J. S. McCormick Co., Pittsburgh 1734
Metallizing Co. of America, Chicago 502
Mexico Refractories Co., Mexico, Mo. 1313
Mine Safety Appliances Co., Pittsburgh 210-12
Mitchell Industrial Tire Co., Chattanooga, Tenn. 2110

*Modern Castings*, Des Plaines, Ill. . . . . 220
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Monsanto Chemical Co., Plastics Div., St. Louis . . . . . 1827
Jesse T. Morie & Son, & Daniel Goff Co., Mauricetown, N. J. . . . . 103
Moulder's Friend, Dallas City, Ill. . . . . 1138

Nassau Smelting & Refining Co., Tottenville, Staten Island, N. Y. . . . . 802-04
National Carbon Co., Division of Union Carbide & Carbon Corp., New York . . . . . 1635-43
National Crucible Co., Philadelphia . . . . . 204
National Dust Collector Corp., Chicago . . . . . 409-411
National Engineering Co., Chicago . . . . . 1412-16, 1511-19
National Foundry Sand Co., Detroit . . . . . 2001
National Pulverizing Co., Millville, N. J. . . . . 2115
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Niagara Falls Smelting & Refining Div., Continental Copper & Steel Industries Inc., Buffalo . . . . . 604
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North American Smelting Co., Wilmington, Del. . . . . 2105-11

S. Obermayer Co., Chicago . . . . . 1539
Ohio Crankshaft Co., Tocco Div., Cleveland . . . . . 1437
Ohio Ferro Alloys Corp., Canton, O. . . . . 1810
Oliver Machinery Co., Grand Rapids, Mich. . . . . 1315-19
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Pennsylvania Foundry Supply & Sand Co., Philadelphia . . . . . 803-07
Penola Oil Co., Detroit . . . . . 1323
Penton Publishing Co., Cleveland . . . . . 1521
George F. Pettinos Inc., Philadelphia . . . . . 228-30, 329-31
Picker X-Ray Corp., White Plains, N. Y. . . . . 1534
Pittsburgh Crushed Steel Co., Pittsburgh . . . . . 1829
Planet Corp., Lansing, Mich. . . . . 1134
Pressure Match Plate Co. Inc., Philadelphia . . . . . 1536A
Pyrometer Instrument Co., Bergenfield, N. J. . . . . 1736A

Redford Iron & Equipment Co., Detroit . . . . . 1435
Reed Roller Bit Co., Cleco Div., Houston, Texas . . . . . 709-11
H. H. Robertson Co., Pittsburgh . . . . . 1542
Roessing Bronze Co., Etna, Pa. . . . . 109
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Ross-Tacony Crucible Co., Philadelphia . . . . . 437
Royer Foundry & Machine Co., Kingston, Pa. . . . . 1913-19

Safety Clothing & Equipment Co., Cleveland . . . . . 241
George Sall Metals Co., Philadelphia . . . . . 1922
Claude B. Schneible Co., Detroit . . . . . 704-08
A. Schrader's Son Div., Scovill Mfg. Co., Brooklyn, N. Y. . . . . 1933
Schramm Inc., Westchester, Pa. . . . . 1347-49
Scientific Cast Products Corp., Cleveland . . . . . 311
Semet-Solvay Div., Allied Chemical & Dye Corp., New York . . . . . 710-12
Shalco Engineering Corp. and Shallway Corp., Connellsville, Pa. . . . . 238-40, 339-41
Shell Process Inc., Chicopee, Mass. . . . . 1312-16
Shell-O-Matic Inc., Irvington, N. J. . . . . 1948
Simplicity Engineering Co., Durand, Mich. . . . . 1108
Sipi Metals Corp., Chicago . . . . . 1120
G. E. Smith Inc., Pittsburgh . . . . . 1325
Solvay Process Div., Allied Chemical & Dye Corp., New York . . . . . 809
Specialty Products Co. & Hickory Specialty Co., Jersey City, N. J. . . . . 1736B
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Standard Electrical Tool Co., Cincinnati . . . . . 1838
Standard Horse Nail Corp., New Brighton, Pa. . . . . 901
*Steel*, Cleveland . . . . . 1521
Steel Shot Producers Inc., Butler, Pa. . . . . 1829
Sterling Wheelbarrow Co., Milwaukee . . . . . 1911
Frederic B. Stevens Inc., Detroit . . . . . 216
Stroman Furnace & Engineering Co., Franklin Park, Ill. . . . . 1118
Superflux Mfg. Co., Allen Park, Mich. . . . . 239
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Taggart Brimfield Co., Hammonton, N. J. . . . . 911
G. H. Tennant Co., Minneapolis . . . . . 1335
Thiem Products Inc., Milwaukee . . . . . 1939
Thor Power Tool Co., Aurora, Ill. . . . . 1839

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Unistrut Products Co., Chicago . . . . . 2008-10
United Oil Mfg. Co., Erie, Pa. . . . . 1411
United States Electrical Tool Co., Cincinnati . . . . . 2007
United States Gypsum Co., Chicago . . . . . 904
U. S. Reduction Co., East Chicago, Ind. . . . . 812
United States Rubber Co., New York . . . . . 206
Vacu-Blast Co., Belmont, Calif. . . . . 1918
Vanadium Corp. of America, New York . . . . . 414-501
Vesuvius Crucible Co., Pittsburgh . . . . . 811
Vibron Div., Burgess-Sterbentz Corp., Cleveland . . . . . 102

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Wheelabrator Corp., Mishawaka, Ind. . . . . Stage
Whirl-Air-Flow Corp., Chicago . . . . . 1326
Whitehead Brothers Co., New York . . . . . 1011
Whitehead Metal Products Co., New York . . . . . 1301
Whiting Corp., Harvey, Ill. . . . . 1932-40
Wolverine Foundry Supply Co., Detroit . . . . . 2113
Zack Co., Detroit . . . . . 1904

Six Foundrymen

# TO BE HONORED

**Gold medals and honorary life memberships for outstanding service to be presented at annual banquet during the Atlantic City convention**

CHARLES C. SIGERFOOS professor of metallurgical engineering, Michigan State University, has been named first recipient of the Thomas W. Pangborn gold medal in recognition "of his contributions to the society and the castings industry, particularly in the field of education of engineering students for foundry careers." Professor Sigerfoos, a graduate of Purdue University, has been a faculty member at Michigan State since 1935. He is a past chairman of the AFS Central Michigan Chapter and faculty advisor of the society's MSU Student Chapter.

JAMES S. VANICK will be honored with the William H. McFadden gold medal "for outstanding contributions to the society and for valuable service to the ferrous castings industry over a period of many years." Mr. Vanick, metallurgist with the Development and Research Division of International Nickel Co. Inc., New York, joined the organization in 1922. He was graduated from Case Institute of Technology in 1919 and two years later received a master's degree in science from George Washington University. Mr. Vanick has been active in committee work of the AFS Gray Iron Division, and was chairman of the AFS Metropolitan Chapter in 1952-53.

HAROLD F. BISHOP has been named the Joseph S. Seaman gold medalist "for outstanding contributions in the field of castings research . . . and for contributions to the society." Mr. Bishop is head of the casting section, metal processing branch, Naval Research Laboratory, Washington. He has spent his entire career in metallurgy at the laboratory. A graduate of Michigan State University, Mr. Bishop is a member of the Washington Society of Engineers, Washington Academy of Science and the American Society for Metals in addition to the AFS. He is well known for his writings and talks before foundry groups.

CHARLES C. SIGERFOOS

JAMES S. VANICK

HAROLD F. BISHOP

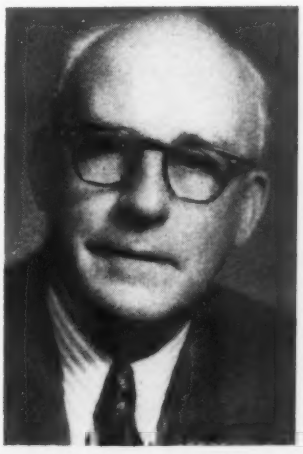
# by AFS

**WILLIAM D. McMILLAN** supervisor of metallurgy at the McCormick Works, International Harvester Co., Chicago, will be awarded an honorary life membership in the society "for outstanding contributions to the society and the ferrous castings industry." Mr. McMillan, a graduate of the University of Chicago, has been with International Harvester Co. since 1923. He has been active in the committee work of the AFS Malleable Division and was president of the Chicago Chapter in 1949-50.

**JOSEPH C. PENDLETON** retired superintendent, foundry division, Newport News Shipbuilding & Dry Dock Co., Newport News, Va., will receive an honorary life membership in recognition of his "outstanding contributions to the advancement of the arts and sciences of metal castings, particularly in the field of naval architecture requirements." Mr. Pendleton served as a foundry apprentice with the Seaboard Air Line Railway, Portsmouth, Va., and the Newport News Shipbuilding Co. He supplemented that training with studies in foundry metallurgy and management at Winona Technical Institute, Indianapolis. His career has included teaching foundry practice at the University of Illinois, Urbana, Ill.; master molder, Norfolk Naval Shipyard, Portsmouth, Va.; and as superintendent in the two shops where he had received his apprentice training.

**BRUCE L. SIMPSON** as retiring president of the American Foundrymen's Society, becomes an honorary life member of the society. Mr. Simpson is president of National Engineering Co., Chicago. A graduate of Northwestern University and of Northwestern Law School, he joined National Engineering as purchasing agent, later becoming vice president in charge of production, and has been president since 1943.

WILLIAM D. McMILLAN



JOSEPH C. PENDLETON

BRUCE L. SIMPSON

# Questions and Answers

**Dross showing up on cope side of small manganese bronze propeller undoubtedly results from gating method . . . Small brass and bronze bells made by several methods . . . Recovering aluminum from dross is job for smelter . . . Degasification of pure copper**

## Manganese Bronze Propellers

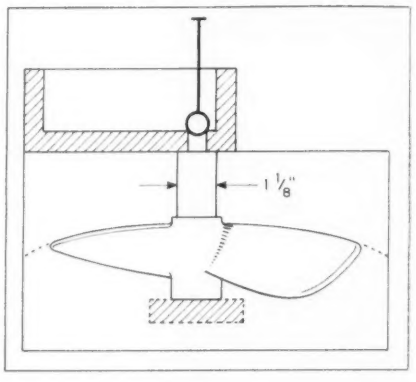
**QUESTION** We have a problem with some small manganese bronze propeller castings we are making. For examination, we are sending a casting with the gates attached and a section of one of the blades. The propellers are cast in green sand molds using No. 1 Albany sand. Metal is melted in a crucible in an oil-fired furnace without any flux. Metal is melted and then heated until it flares for one to two minutes. Our rejects have been running about 10 per cent, due to what appears to be dross in the blade near the hub on the cope side. In some cases this does not show up until the casting is polished, and then only as small specks which, after a few weeks' use in salt water, open up.

**ANSWER** Examination of the propeller confirms your remarks about the presence of dross. In our opinion, the difficulty arises from your complicated system of gating. Your use of a double horn gate defeats the purpose for which it is designed, because the two converging streams create turbulence — the condition which must be avoided with manganese bronze.

We suspect that the thin branch runners from the large sprue to the horn gates tend to produce turbulence from the pressure developed. If you want to continue with horn gating, we suggest only one opening into the center of the propeller hub. The runner from the sprue to the horn gate should be about ¾-in. square. The sprue should be tapered from 1 in. in diam near the top, which is cupped to permit the pourer to "hit" it easier, to ½-in. in diam at the bottom, where it opens into the runner.

Preferably we would eliminate the horn gate since, unless carefully removed, broken edges are encountered. We would substitute a runner channel made in cores to extend from the sprue, which is choked, to the bottom of the hub.

We believe, however, that the best solution is to gate directly into the hub, using a basin, reservoir or runner box and plug as shown in the accompanying sketch. The basin preferably should be made of baked core sand with a ½-in. hole located over the center of the hub when in place. As indicated, it extends from the edge of the flask and slightly over the edge of the riser or hub opening. That portion is somewhat smaller than the hub to indicate the cutting-off point. A runner box or basin with a 2 x 2-in. cavity should be more than sufficient to hold the desired amount of metal for filling the propeller cavity and riser.




Suggests method for gating propeller at the top employing a pouring basin

Prior to filling the basin, the hole at the end is plugged with a small iron ball fastened to a rod, or by any other suitable means. The basin is filled to the desired height with molten metal, and after a short interval the plug is lifted, permitting only clean metal to enter the cavity. If the falling stream of metal tends to erode or cut the sand at the bottom of the hub portion, place a small core, clean iron chill or piece of firebrick at that point.

The above recommendation that the basin be filled to the desired height with molten metal refers to the fact that the basin will hold more than enough metal to fill the propeller cavity and the riser, assuming that the propeller weighs about 4 lb and that 14 x 14 x 4-in. flasks are used. With a little experimenting you can fill the basin to the point where all the metal flows out, filling the riser almost to the top of the flask. We also suggest reducing the height of the riser to that point where the shrink or pipe descends almost to the hub, thereby

Present gating has double horn gate attached to sprue by thin branch runners

saving on amount of metal poured.

We recommend that you stop flaring the manganese bronze. Heat it to the point where it just begins to flare, remove from the furnace and skim. Hold until breaking the surface with the skimming rod just shows intermittent puffs of zinc oxide fume. Then pour.

## Discusses Molding Practices

**QUESTION** We are in need of a book on the molding of small brass and bronze bells and bushings, particularly literature that is nontechnical. Some 30 years ago we used to work in a foundry, but it appears we have lost the knack.

**ANSWER** We regret that we do not know of any book which will supply sufficient information on making small bells and bushings.

Since you have some familiarity with foundry practice, you know that you will have to obtain a suitable molding sand which is not too coarse and not too fine for the section and weight of the castings to be made. Any sand supplier with the required information on the castings undoubtedly could meet your requirements. Watch the moisture content (about 6 to 8 per cent for natural molding sand) so that it is not too dry or too wet. If too dry, it will not ram properly and will tend to drop out of the flask when the mold is lifted from the pattern. If too wet, there will be trouble from castings with blowholes, bad surfaces, etc.

Ramming the sand requires some experience. If the ramming is soft, the castings may be too large or the sand may be eroded or cut by the molten metal. If ramming is too hard, the gases generated cannot escape and the castings may contain blowholes or bad surfaces due to a boiling action.

We can discuss molding procedures only in generalities, due to space limitations. Small bells such as table dinner bells could be made by mounting a number in a row on a board, mouth down to form the cope mold. Drag pattern contains depressions forming the inside contours of the bells. Both cope and drag could be combined into one pattern, as indicated in the accompanying sketch.

Another variation would be to make small dry sand cores to form the inside contour of the bells instead of forming that portion in green sand on the drag. That procedure might be preferable where production is not a problem. With one corebox sufficient cores could be made for a given number of bells. A drag contoured pattern would not be required since a flat board with disks to form prints for the cores, as indicated in the sketch, will serve.

Bells are poured through the top, using a runner basin as illustrated at the right hand side of the sketch. To eliminate the possibility of cutting or eroding the sand when the full green sand method is followed, it may be advisable to use a small dry sand "cap" core to form the top. A nail placed in that core when made will keep it in place on the green sand mound. Larger bells will have to be made singly, following the same principle of mouth down, using a core at the top and a pouring cup over the center.

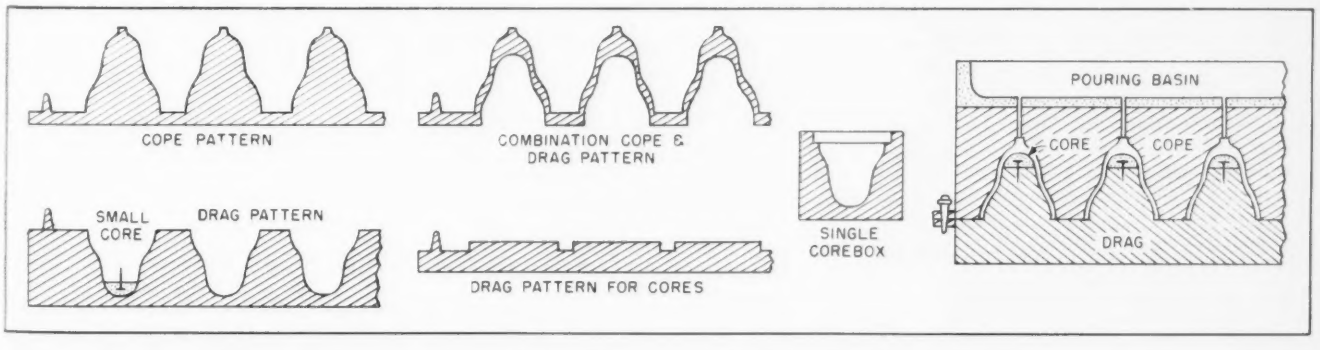
Bushings also may be made in several ways. Small ones may be poured in the horizontal position. The usual procedure is to arrange a number on both sides of and perpendicular to a central runner. Branch gates from the runner lead into the ends of the bushings. Although some foundries pour large bushings in the same manner, the preferred method is to pour on end or vertically. Some producers prefer to gate through the bottom while others use a ring of pencil or pop gates at the top.

## Recovering Metal from Dross

**QUESTION** With several aluminum foundries in this area we are considering an operation for recovering aluminum from dross which we can obtain, but we have some questions concerning the operation. We assume that it will be necessary to melt the recovered metal and pour into ingots. Where can we find a ready market for this metal and what would be considered a minimum weight that a customer would be interested in for shipment? Is it necessary that secondary metal of this type be a recognized alloy or could it be sold profitably in the "as-is" condition? We will have no laboratory facilities, but could make arrangements for occasional analysis if necessary.

**ANSWER** Recovery of aluminum from dross involves considerably more than meets the eye, and our advice is to leave that operation to those already engaged commercially in the field. In the first place, your only salvageable material is the metallic aluminum in the dross; to obtain it, the dross must be crushed or ground in ball or hammer mills to 20 to 40 mesh size. The crushed material then is screened to obtain the metallic aluminum. The remaining material, mainly oxides, might be sold to producers of aluminum salts if the aluminum content is sufficient for processing.

Drosses from the average alumi-




Sketches indicating various procedures which might be employed for molding small brass and bronze bells

num foundry may contain only 30 to 40 per cent metallics, even when kept relatively clean and not exposed to outside weathering. Further losses are encountered in melting the recovered metallics, which mainly are in a finely divided state, so that if you start with material containing the higher value in metallic content, probably only 30 to 35 per cent is obtained in ingot form.

To be saleable, composition of the metallic material would have to be known. Preferably, adjustments should be made during melting to bring the composition within limits of aluminum alloys in common use. This practice means that you hardly could operate without laboratory control. A logical market for the ingot would appear to be the foundries from which you obtain the dross since they are close by, and based on probable recovery, could take all the ingot you can supply. We are not sure of the minimum quantity of ingot which would interest a consumer, but suspect it would be at least 500 lb.

As indicated earlier, to obtain any reasonable recovery of metal from aluminum dross requires a grinding and separation process. While melting of the recovered metal could be done in crucibles on a small scale, investment in grinding and screening equipment would be high. To keep overhead costs reasonable, the equipment would have to be operated at as near capacity as possible at all times.

## Producing Chilled Car Wheels

**QUESTION** Will you please inform us where we can locate information on making and casting chilled car wheels? Also on how to make a soaking pit.

**ANSWER** Descriptions of the procedures employed in producing chilled car wheels have appeared in the literature from time to time.

Briefly, the molds are made in circular flasks equipped with trunnions. Ramming is accomplished in one plant by jolting in conjunction with a heavy weight (1600 lb) placed on top of the sand. This weight contains projections about 3 in. deep which penetrate into the sand between the bars. Drag mold is filled with sand after the pattern is covered with facing sand, jolted a couple of times, and struck off. The weight is placed in position and the mold given six to eight jolts. The weight is removed and the mold is rolled over and placed on a conveyor or bottom board. Then the center or hub core is placed in position.

The cope is a special flask with curved bars conforming to the concave shape of the wheel and having a metal cylinder in the center for forming the pouring cup. The cope flask is bolted to a contoured cast iron chill or ring which forms the wheel tread. A ring core with three gate openings is set over the hub on the pattern, and covered with a round wood plug about 3½ in. smaller than the inside of the metal cylinder on the cope. Sand is packed tightly around the plug, the flask filled with sand and jolted as in the case of the drag. After jolting, the plug is removed and the cope placed on the drag.

Molds are poured from bottom-pour ladles with an iron containing about 0.55 per cent Si at a temperature of 2500°F. Time of shakeout is controlled so that the hub is at a temperature of about 1900°F, the plate or web about 1550°F and the tread about 1200°F—giving an average volume temperature of 1550°F. Within 2 to 3 minutes after shakeout the wheels are placed in the annealing pits and allowed to soak for 72 hr. They are taken out, stacked away from drafts, and allowed to cool to handling temperature.

Annealing pits are about 38 in. inside the pipe guides for centering, and are steel shells lined with 6 in. of light-weight insulating brick. Openings near the bottom, at the center and at the top are provided for insertion of thermocouples to check the temperature. Pits hold 20 to 24 wheels and are covered with insulated lids. No external heat is employed. Temperature drop in the pits is about 7°F per hr.

## Gas Absorption Causes Defect

**QUESTION** In our foundry in Argentina we started making copper blast furnace tuyeres according to the method described in the Question and Answer department of the July, 1955 issue. At first we had a little difficulty with the shape, size and position of the sprue, as we found some holes at the intersection of the gate and casting. Aside from that, the castings looked all right, but on machining a number of small holes appeared which resulted in rejection. After overcoming the molding problems, we believe our main difficulty lies in melting and pouring the copper since it is our first attempt. We used electrolytic copper covered with charcoal to prevent oxidation as mentioned, and also have used calcium boride. Pouring temperature was 1200° C (2200° F). Castings weigh 250 kg (550 lb).

**ANSWER** If we understand your communication correctly, you have eliminated the trouble from holes occurring at the juncture of gate and casting. This condition presumably was caused by the gate freezing off before the casting was completely solidified. Your problem now is to eliminate the small holes which appear just under the skin when the casting is machined. We suspect, as you indicate, that these holes result from absorption of gas by the copper during melting. While you mention use of calcium boride, you do not state whether you employ the test plug or specimen to determine whether or not the metal is relatively free from gas before pouring.

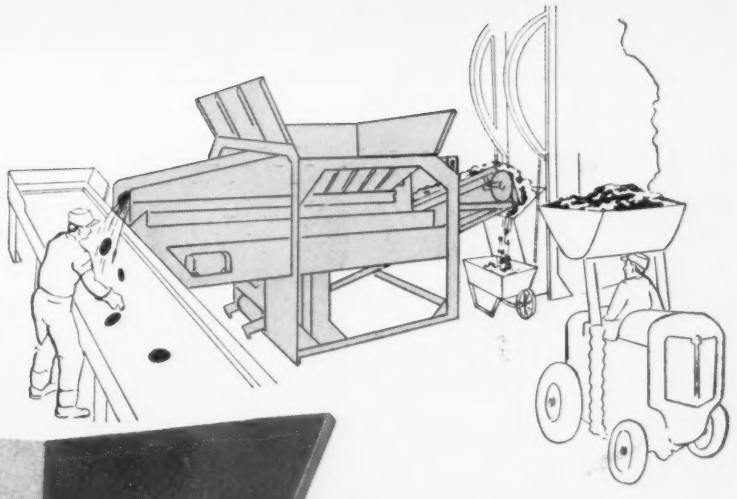
As mentioned in the July issue, the charcoal cover must be dry (and preferably dust-free). To insure dryness, it might be a good idea to ignite the charcoal beforehand, and use the hot coals. Some authorities recommend additionally that the crucible be covered with a lid or the bottom of an old crucible. Naturally none of the copper composing the charge should project above the top of the crucible. Heat as rapidly as possible up to about 2300°F. Then dip out with a small graphite crucible—previously brought to temperature—sufficient metal to pour the test plug or specimen.

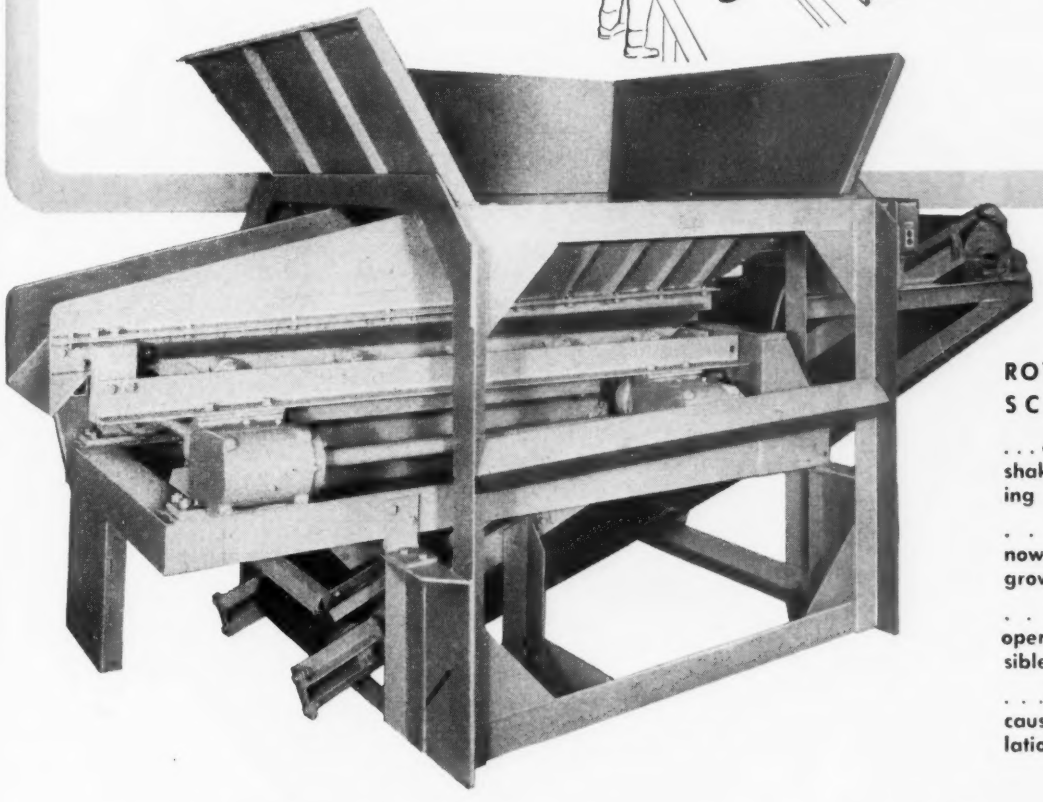
While we suggested a plug 1½ in. in diam and 3 in. long, Roast recommends one formed of a combination disk and cylinder 3 in. high to accentuate the shrinkage characteristics. Disk forming the bottom portion is 3 in. in diam and 1 in. high. Joining cylinder is 1½ in. in diam and 2 in. high. A smooth fillet from the edge of the disk extending up ½-in. on the cylinder should be incorporated on the pattern. Molds for the test specimen are made in dry (baked) sand.

The mold is filled with the molten copper up to about 1 in. from the top or just above the fillet. Owing to contained gas, the metal in the mold probably will split and mushroom up in the neck or vacant space. Metal in the crucible then is degassed by the addition of 0.25 per cent calcium boride or a proper amount of other degassing agent. The boride should be enclosed in thin-wall copper tubing swaged shut at both ends. With a suitable holder it is plunged to the bottom of the crucible and held there until action ceases. Then another test plug should be poured.

If the copper is properly degassed, a deep pipe or shrink cavity will appear in the top of the plug. If it does not, then further addition of calcium boride must be made.

# One Simple **MECHANIZED** Operation





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**. . . gives mechanization now, yet allows for future growth**

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Front end loaders scoop up sand and castings from the molding floor and deposit them into the ample hopper of the Royer. The rapid, positive walking-beam action of the shake-out breaks up the sand and conveys the castings and large scrap off the end to sorting table or conveyor. Magnetically cleaned sand is discharged at the opposite end to muller skip hoist, conveyor belt to a sand handling system or into a Royer Sand Separator & Blender for complete sand conditioning. Entire unit is above floor level, eliminating costly pits and excavations . . . high casting and sand discharges allow related equipment to also be located above floor level.

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# Men of Industry

RICHARD E. WHINREY
*. . . Chain Belt Co. v. p.*

ALFRED H. STULLICK
*. . . joins Superior Brass*

AHTI A. ERKKINEN
*. . . becomes general mgr.*

A. J. McDONALD
*. . . retires, American Steel*

**RICHARD E. WHINREY** was elected a vice president, Link-Belt Co., Chicago. He is general manager of the company's Ewart plant, Indianapolis, a position he has held since 1951. Mr. Whinrey was graduated from Purdue University in 1925. He joined Link Belt's Indianapolis Dodge plant that year and became assistant general manager there in 1949. The following year he was transferred to the Ewart plant in a similar capacity.

**Andrew G. Heilman,** president and owner of Tiffin Foundry Inc., Tiffin, O., this May is marking his 60th year in the foundry industry. Mr. Heilman received his early foundry training at the Anderson Works, now the National Machinery Co., Tiffin. In 1913 he became superintendent, Burch Plow Works, Crestline, O. Moving to Cleveland in 1916, he became a partner in Meech Foundry Inc. there in 1919. Mr. Heilman established his own company in Tiffin in 1940. For the last ten years his daughter, Evalyn H. Jones, has been associated in the business as vice president. A grandson, Melvin A. Jones, joined the company a short time ago.

**Donald A. Beadell** was appointed manager of industrial chemicals development of the recently formed Development Department, Archer-Daniels-Midland Co., Minneapolis. **Dr. Verne C. Bidlack Jr.** will work with resins and plasticizers, and **Walter Thulin** has been assigned to agricultural products.

**Alfred H. Stullick** was appointed foundry superintendent, Superior Brass Works, Detroit, succeeding **Peter Jelby,** who was made chief engineer. For the last 5 years Mr. Stullick was foundry superintendent, Attwood Brass Works Inc., Grand Rapids, Mich., and previously spent several years in that capacity with Crucible Brass Foundry Co., Rochester, Mich.

**Ahti A. Erkkinen** was appointed general manager and a director, Fremont Casting Co., Worcester, Mass. A graduate of Brown University, Mr. Erkkinen joined B.I.F. Industries (formerly Builders Iron Foundry), Providence, R. I., in 1938 and was named assistant works manager in 1941. He became employment manager in 1944 and since 1946 was superintendent of the foundry and pattern shop. Active in the New England Foundrymen's Association, he was its vice president last year.

**A. M. Roberts** was appointed assistant to the plant manager, American Chain Division, American Chain & Cable Co., York, Pa. **C. H. Raab** succeeds Mr. Roberts as chief metallurgist for the division.

**A. J. Fruchtl,** until recently associated with W. Thomas Barr Associates, Birmingham, has joined the research and development staff of James B. Clow & Sons, Inc., Coshocton, O., where he will direct cast iron process development. Mr. Fruchtl was previously manager of the North Birmingham Pipe Plant, United States Pipe & Foundry Co. He has been chairman of the Birmingham Chapter of the American Foundrymen's Society for the past year.

**A. J. McDonald** has retired as vice president in charge of the Washington office, American Steel Foundries, Chicago. In 1939 Mr. McDonald resigned as vice president in charge of sales, Lebanon Steel Foundry, Lebanon, Pa., to accept a similar position with American Steel Castings Co., Newark, N. J., a subsidiary of American Steel Foundries. Four years later he was elected vice president of the latter company and was transferred to Chicago headquarters in charge of the industrial steel castings division. Mr. McDonald served as chief of the Iron and Steel Castings Section, Iron and Steel Division, National Production Authority, from 1950 to 1952, when he became Washington representative for American Steel Foundries. He has just completed his third term as president of the Steel Founders' Society of America, and will remain in Washington as representative for the society there.

**Jesse L. Powers** was appointed general manufacturing manager, Buick Motor Division, General Motors Corp., Flint, Mich., succeeding **Edward T. Ragsdale,** who was named general manager of the division. **Donald F. Taylor** has become assistant general manufacturing man-

# read how you can save up to $290 a day in cupola coke consumption

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"How To Make Your Cupola Operation More Efficient"—FO-1




"Hot Blast For Better Melt, Closer Control, Greater Economy"—FO-3



"Review Of Foundry-Cupola Gas and Temperatures"—FO-9



"Suggestions For Solving Some Cupola Operation Problems"—Bulletin FO-8

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Now any cupola can be converted at low cost with a Whiting-Thermo Hot Blast Heater to provide the highest efficiency in hot blast. Whiting has prepared a new booklet on this cost cutting hot blast heater which tells about all hot blast advantages. It also fully describes burners, combustion chambers, heat exchangers, air booster fans, control panel and controls, auxiliaries, and air by-pass as well as general design features. Write for this free booklet today! Ask for Bulletin FY-174. Ask for the other bulletins shown also!

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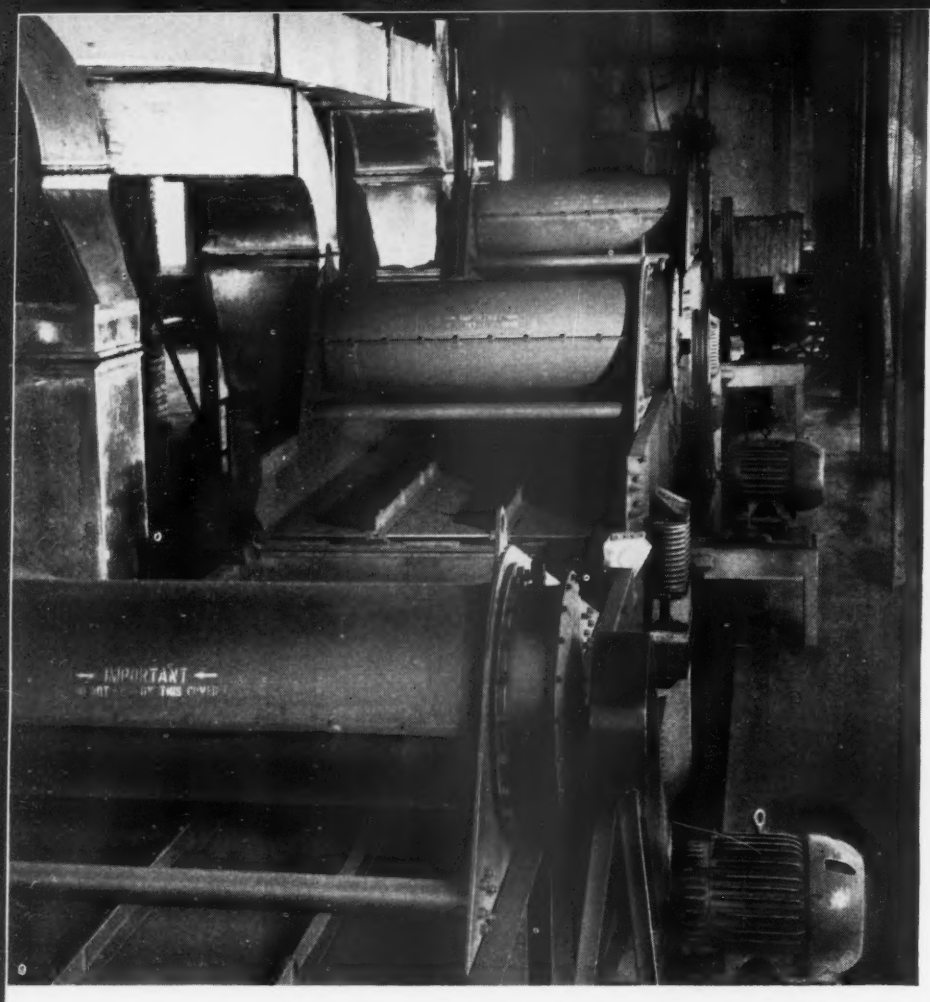


# HOW LYNCHBURG FOUNDRY USED PROFESSIONAL ENGINEERING TO SOLVE HIGH-VOLUME PRODUCTION PROBLEMS AT INDUSTRY'S NEWEST, MOST MODERN SHELL MOLDING PLANT

## NEW FACILITIES ENGINEERED BY GIFFELS & VALLET PRODUCE 100 TONS OF FINISHED CASTINGS IN 24 HOURS!

The Lynchburg Foundry Company's new shell molding plant was built to produce large quantities of close tolerance, fine finish castings. Although shell molding is highly adaptable to mechanized operations and offers many other advantages, the planning and engineering for an installation of this size posed many new problems.

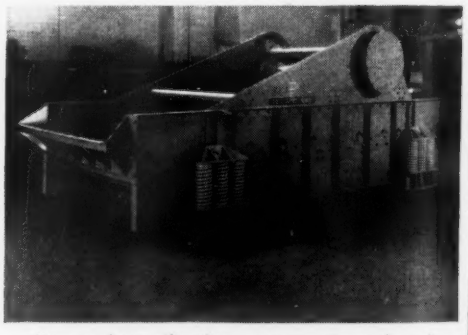
**Sand is discharged from hopper bottom railroad cars, aerated, and delivered to storage silos pneumatically.**

As the project progressed, the extensive facilities of both organizations were coordinated on all phases of design, engineering, equipment specification and construction. In many instances, G & V's background of experience in other industries proved of great value. Two specific examples of this were the methods used to handle the extremely fine molding sand, and the large quantities of iron shot used for shell backup.

The major sand handling problems were to control dust, prevent segregation, and introduce complete mechanization. 100 tons of dry sand with an average AFS fineness of 120 are used per 24-hour day. The sand is removed from box cars into storage silos, batched, and transported to the mullers by a completely enclosed pneumatic handling system. A specially designed cone, orifice and air slide at the base of each storage silo reverses the segregating effect of the sand entering the silo. Batches for the mullers are accurately measured by a unique electronic weighing instrument. This new sand handling system keeps dust and segregation at a minimum, and is similar to the modern mechanized methods employed in the bulk handling of cement, flour, and other dry materials.

**Completed plant, looking toward the cupolas.**

About 125 tons per hour of shot must be separated from the castings, then cooled and cleansed of sand. This is accomplished by a series of vibrating screens constructed of heavy-duty stainless steel cloth. Air exhausted through the screen at the rate of 150 CFM per square ft. cools the shot from above 300° to below 150°. The screen is designed so that air pull is equal at every point on its surface. Rate of travel and depth of the shot bed can be readily adjusted to meet varying requirements. All transfer points in the system are provided with a "stone box" so that the highly abrasive shot falls upon other shot, rather than abrading the chutes themselves. This method was adapted from similar applications in the cement and rock products industry.



**Heavy duty vibrating screens air cool and clean the shot without the use of water.**

These are but several examples of the many ways in which Giffels & Vallet's comprehensive planning-engineering services have pointed the way to greater output, lower costs and improved casting quality for the foundry industry. These services are discussed in a special Foundry Brochure. A copy will be mailed on request.

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**ENGINEERS SERVING INDUSTRY FOR OVER 30 YEARS**

THEODORE W. DANIELS
*. . . retires, U. S. Steel*

HENRY S. CHILLAS
*. . . advertising mgr., Whiting*

WARREN A. SCOTT
*. . . foundry division sales mgr.*

FRANK S. BREWSTER
*. . . becomes research director*

ager and **Joseph J. Schweinfurt** was named general superintendent in charge of production of all plants.

**Theodore W. Daniels,** assistant general superintendent, Roll & Machine Works, United States Steel Corp., Canton, O., retired recently. A graduate of Bowdoin College, Mr. Daniels joined the Canton plant in 1936. Engaged in the manufacture of iron rolls for over 43 years, previously he was plant superintendent, Mackintosh-Hemphill Co., Pittsburgh, and plant manager, Wheeling Mold & Foundry, Wheeling, W. Va. **Ralph I. Swanson** has succeeded Mr. Daniels as assistant general superintendent of the Roll & Machine Works. He joined the company's Gary, Ind., Steel Works in 1930, and served in various capacities, becoming development metallurgist and general supervisor of research, metallurgical department. In 1953 he was transferred to Roll & Machine Works as assistant to the general superintendent.

**Henry S. Chillas** was named advertising manager, Whiting Corp., Harvey, Ill., succeeding **Anthony De Young,** who has retired. Mr. Chillas has been assistant advertising manager since 1952.

**Richard A. Aleshire** was appointed Pacific Coast sales representative, Simplicity Engineering Co., Durand, Mich., with headquarters at 7719 Gerda Court, Whittier, Calif. Since 1948 he was associated with Brown-Bevis Industrial Equipment Co., Los Angeles.

**William J. Sweeney** was appointed Pacific regional sales manager, Behr-Manning, division of Norton Co., Troy, N. Y., succeeding **Paul S. Wiswell,** retired. **Fredrick D. Stevens** was named Los Angeles divisional sales manager, the position Mr. Sweeney held since 1948. **John C. McGreivey** has succeeded **A. F. Lehnhardt** as New York divisional sales manager.

**Frank S. Brewster** has been appointed director of research and development, Brumley-Donaldson Co., Los Angeles. Mr. Brewster joined the company a year ago as foundry consultant, after 9 years with Harry W. Dietert Co., Detroit, where he had been vice president and general manager. **Warren A. Scott,** who recently joined Brumley-Donaldson's sales staff, has been appointed sales manager of the Foundry Division in southern California.

**Gordon E. Ketring** was named assistant to the western sales manager, Chemical Division, Borden Co., New York. Mr. Ketring joined the Chemical Division in 1950, at Seattle, and since 1953 was in charge of the company's Washington industrial adhesives sales.

**Sam Ledbetter, A. E. Green** and **Frank Hoenigmann,** formerly associated with Jervis B. Webb Co., Detroit, have been reassigned to the

RICHARD A. ALESHIRE
*. . . Pacific Coast sales*

FREDERICK D. STEVENS
*. . . Los Angeles sales mgr.*

JOHN C. McGREIVEY
*. . . New York sales mgr.*

WILLIAM J. SWEENEY
*. . . Pacific sales mgr.*

Jervis B. Webb Co. of Georgia, Atlanta. Mr. Ledbetter was appointed a district sales manager with headquarters in the Atlanta office. Messrs. Green and Hoenigmann were appointed district sales managers in the Charlotte, N. C., and Jackson, Miss., offices, respectively.

**William A. Geisler** has joined the Foundry Equipment Division, Davenport Machine & Foundry Co., Davenport, Iowa. A graduate of State College, Duisburg, Germany, Mr. Geisler came to the United States in 1929 and was associated with Western Foundry Co., Chicago, Eastern Steel Castings Co. and Dursar Corp., Newark, N. J., until 1933, when he returned to Germany. He was engaged in management, study and building of foundries there until 1948 when he joined Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., as supervisor of sleeve production and research work, later starting its first shell-mold foundry. In 1952 and 1953 he was foundry manager, U. S. Foundry Corp., Kalamazoo, Mich., and consulting engineer, Lester B. Knight & Associates, Chicago. For the past two years he was foundry manager, Kiekhaefer Aeromarine Motors, Fond du Lac, Wis. Experienced in the application of core shooters, Mr. Geisler will act as technical advisor in his new position with Davenport Machine & Foundry Co.

**W. H. Fellows** and **L. B. Bellamy** were named vice presidents, Abrasive & Metal Products Co., Detroit. Mr. Fellows will continue to direct the sales of Peninsular Grinding Wheel Division, Detroit, and Sterling Grinding Wheel Co., Tiffin, O., company abrasive subsidiaries. Mr. Bellamy, formerly general manager of operations for Sterling Grinding Wheel Co., will direct manufacturing operations of the company's subsidiaries. **W. R. Morgan,** named a vice president of Sterling Grinding Wheel Co., will serve as general manager of operations of that company.

**H. B. Caldwell** was appointed manager of the New York district office, Whiting Corp., Harvey, Ill., in charge of engineered products sales in eastern New York, northern New Jersey, and all of New England.

**Adam J. Kafka,** until recently associated with Beardsley & Piper Division of Pettibone Mulliken Corp., Chicago, has joined Sutter Products Co., Dearborn, Mich. He will cover sales assignments on a national basis. Mr. Kafka entered the foundry equipment field with Champion Foundry & Machine Co., Chicago, in 1935.

**Albert P. Gagnebin** was named manager, Nickel Sales Department, International Nickel Co., New York, succeeding **Ransom Cooper Jr.,** who has retired after 33 years of service. **Harold Larsen** has become assistant manager of the department, a position Mr. Gagnebin has held for the past year. Mr. Gagnebin, who joined the company in 1930, was previously in charge of the ductile iron section of the Development and Research Division. In 1952, with Keith D. Millis, now head of the company's ductile iron section, he was co-recipient of the Peter L. Simpson Gold Medal of the American Foundrymen's Society for outstanding work and development in the field of spheroidal cast iron. Mr. Larsen, with International Nickel for 30 years, in 1953 was named assistant to the manager of the Nickel Sales Department. For a time he was on the staff of the National Production Authority, Washington, as chief of the Nickel Section of the Iron and Steel Division.

**John Schuch,** formerly midwest manager of sales, Jarrell-Ash Co., Newtonville, Mass., was appointed general sales manager of the company. A graduate of Michigan State College, he joined the company in 1951. **Gene Roberts** was named sales representative of the new office recently opened at 1430 Boulevard N. E., Atlanta. **Robert Alvord** will head the district office in Muskegon, Mich. **Arthur Edwards** will direct activities of the Chicago office.

**Dr. A. H. Sully,** for the past year associate director of research, British Steel Castings Research Association, Sheffield, England, was named director of research, succeeding **Dr. R. J. Sarjant,** who will continue in an advisory capacity with the association.

**Joseph Rosecky** was named vice president in charge of the Eddystone, Pa., plant, Baldwin-Lima-Hamilton Corp., Philadelphia. He was formerly manager of manufacturing for the Eddystone operations.

**Ted Harley** has joined the sales department, Vesuvius Crucible Co., Swissvale, Pa. He was previously associated with Bethehem Steel Co.,

WILLIAM A. GEISLER
*. . . joins Davenport Machine*

H. B. CALDWELL
*. . . Whiting district mgr.*

ADAM J. KAFKA
*. . . Sutter Products sales*

JOHN SCHUCH
*. . . Jarrell-Ash sales mgr.*

# NEW . . . AIR MANIFOLDS!

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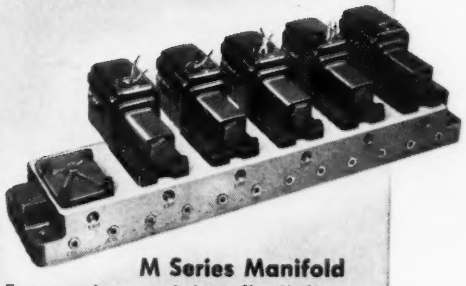
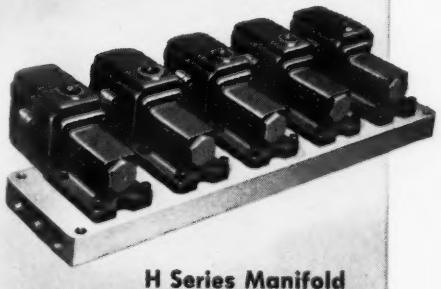


**M Series Manifold**
For maximum piping flexibility. Cylinder ports in both sides and bottom, can be piped from any side or combination of sides.



**H Series Manifold**
Common exhaust manifold, with all exhaust ports manifolded into two exhaust chambers. Allows easy piping or muffling of exhausts. Cylinder ports in bottom face only.

Here is a completely new approach to the problem of mounting, piping, and wiring solenoid operated air valves. The Numatics SA Series offers an entire group of manifolds, providing all the advantages of custom-engineered mountings in a standard catalog line, a significant forward step in fluid controls engineering.

Numatics SA Manifolds save space, simplify piping, improve accessibility, and enhance the appearance of your equipment. All valves in the SA Series, single solenoid spring return, momentary contact, and spring centered, mount interchangeably on any station of the air manifolds. The conduit manifolds eliminate separate electrical pull boxes and conduit runs, can be used with both M Series and H Series air manifolds.

Available for all sizes and models of SA Series valves, in ¼", ⅜", ½", and ¾", pipe sizes, Numatics SA Manifolds are an outstanding development in air controls.

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## NUMATICS, Inc. DEPT. F

MILFORD • MICHIGAN

Bethlehem, Pa., Ford Motor Co., Dearborn, Mich., and Haws Refractories Co., Johnstown, Pa.

**W. D. Kirkpatrick,** vice president and sales manager, American Chain Division, American Chain & Cable Co., York, Pa., retired recently. Mr. Kirkpatrick joined Weed Chain Tire Grip Co. in 1914, and became sales manager of the Philadelphia district when it was merged with American Chain in 1917. He served as sales manager in Chicago and Bridgeport, Conn., and in 1936 was made general manager of sales, American Chain Division. He was named a vice president of the company in 1938 and a director in 1941.

**John R. Hogan** was named manager of the Cleveland branch, Yale Materials Handling Division, Yale & Towne Mfg. Co., Philadelphia. A graduate of Pennsylvania State University, Mr. Hogan was previously engaged in sales for the company in Cleveland and Philadelphia.

**William B. Knoderer** was appointed sales manager, Industrial Division, Gardner-Denver Co., Quincy, Ill. Mr. Knoderer was moved to the home office in Quincy from the Keller Tool Division, Grand Haven, Mich., last year. He was sales manager of Keller Tool Co. before the merger.

**George H. Thurston** was recently appointed sales representative, Duraloy Co., Scottdale, Pa., to handle sales for all of California north of Los Angeles. Mr. Thurston attended University of California and Case Institute of Technology. Until recently he was a consulting metallurgist and manufacturers' representative.

**Hugh Richmond,** for over 4 years with the engineering department in the home office, Hyster Co., Portland, Oreg., was transferred to the sales engineering department of the

HUGH RICHMOND
*. . . truck sales, Hyster Co.*

company's eastern industrial truck division, Danville, Ill. He is a graduate of University of Portland and also attended Oregon State College.

**John J. Elias** was named manager of Southern Mill & Foundry Supply Co., Gastonia, N. C., recently formed for sales and service in the Southern States of shell molding equipment manufactured by Shallway Corp., Connellsville, Pa. Mr. Elias was formerly president, Artisan Pattern Works, Uniontown, Pa.

**Charles Lay,** formerly vice president, Upstate Metal Casting Co., Norwich, N. Y., was appointed shell molding equipment service manager, Shallway Corp., Connellsville, Pa. Before joining Upstate Metal Casting Co. in 1954, he was shell mold superintendent, Bennett-Ireland Inc., Norwich, N. Y.

**Roderick M. Menoch** was named manager of manufacturing services, and **Robert B. Boswell,** chief engineer, Forge and Foundry Division, Chrysler Corp., Detroit. Other appointments in the division include: **James G. Barnes,** comptroller; **Charles S. Keller,** manager of forward planning; and **Samuel P. Elliott,** manager of industrial relations.

**Alfred J. Bremble** was appointed eastern sales manager for Certified Alloys Co., and Aluminum Smelting & Refining Co., both of Cleveland, as well as director of sales in Ohio and Pennsylvania. Mr. Bremble was associated with New Jersey Zinc Sales Co., New York, for the last 29 years.

**Paul Lang** has been appointed sales engineer in the midwest area, Fahralloy Co., Harvey, Ill. Since joining the company in 1952, Mr. Lang has served in both the manufacturing and sales divisions.

**John E. Miller** was appointed vice president, and **J. D. Kettering,** assistant treasurer and comptroller, Miller & Co., Chicago, manufacturers' representative of coke, alloys and pig iron.

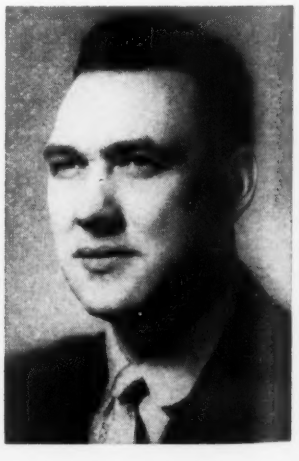
**C. Richard Sword,** since 1952 assistant sales manager, Aerovent Fan Co., Piqua, O., was appointed sales manager, succeeding **James F. Tilton,** resigned.

**Richard C. Aylward** was named general sales manager, Bohn Aluminum & Brass Corp., Detroit. He joined the company in 1947 as a salesman, became a district manager in 1952, and since 1954 was midwest regional manager in Chicago.

GEORGE H. THURSTON
*. . . joins Duraloy Co.*

JOHN J. ELIAS
*. . . Southern sales, Shalco*

CHARLES LAY
*. . . . Shallway service mgr.*



RICHARD C. AYLWARD
*. . . general sales mgr.*

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# STEEL FOUNDERS MEET

## To Discuss Technical and Marketing Developments

By FRANK G. STEINEBACH
*Editor*

SFSA staff members speaking at the annual meeting. From top to bottom: F. Kermit Donaldson, executive vice president; Charles W. Briggs, technical and research director; George K. Dreher, secretary

PLANNING for the future of the industry and the society featured the program of the annual meeting of the Steel Founders' Society of America held at the Drake Hotel, Chicago, Mar. 19-20. Society officers, staff executives and the speakers discussed the future potential for steel castings, how the industry can grow in an expanding economy, and how the society can provide greater service to the industry.

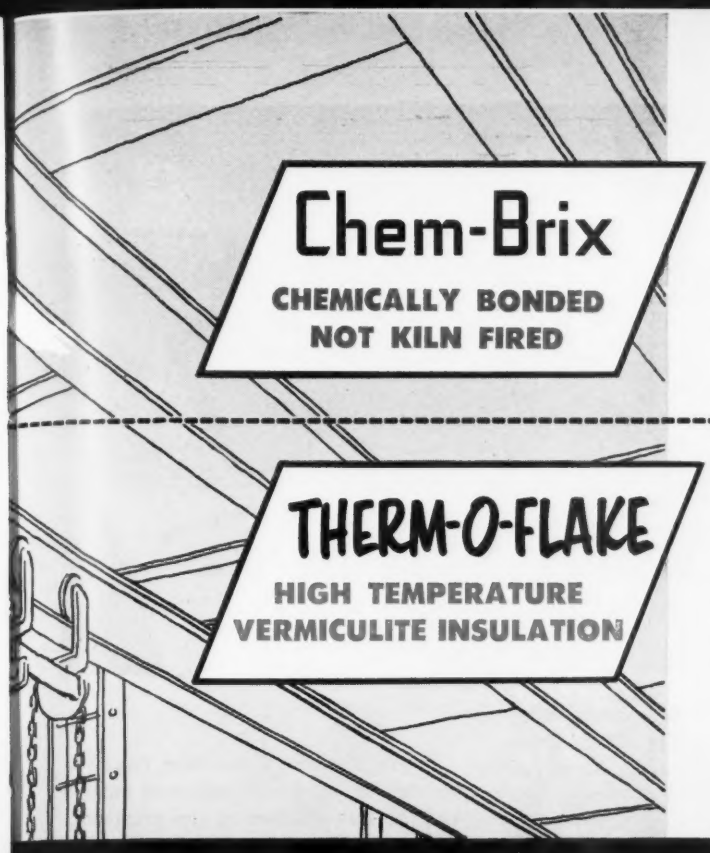
A. J. McDonald, vice president, American Steel Foundries, Washington, and retiring president of the society, reported in some detail on the progress in applying recommendations the Program Appraisal Committee made at the 1954 fall meeting of the society. Developments include enlargement of activities of the Product & Market Development Committee, establishment of a Market Research Committee, initiation of a market design project, greater emphasis on the safety program, consideration of a National Sales Clinic in 1957, study of the functioning of other society activities and the appointment of a Standing Program Appraisal Committee.

Members of the latter committee are: Chairman, Claude L. Harrell, president, Sterling Steel Casting Co., Monsanto, Ill.; A. M. Andorn, chairman of the board and president, Penn Steel Castings Co., Chester, Pa., and Cleve H. Pomeroy, president, National Malleable & Steel Castings Co., Cleveland.

The president reported the incorporation of the Steel Foundry Research Foundation, a nonprofit corporation organized for scientific and educational purposes. Further details about the foundation, including its purposes and officers, are reported on page 324.

F. Kermit Donaldson, executive vice president of the society, emphasized the need of long-range planning if the industry is to participate in future growth of the economy. He emphasized that in times of high

Executive committee of the society includes, left to right: G. W. Myers, Crucible Steel Casting Co., Milwaukee, newly elected vice president; Howard F. Park Jr., General Steel Castings Corp., Granite City, Ill.; newly elected president, and M. G. Moore Jr., Empire Steel Castings Inc., Reading, Pa., new director of Division 1



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***CARBON.*** Chemically bonded Carbon Chem-Brix assure longer service and less spalling, especially for iron and Bessemer steel ladles.

***ALL SILICA.*** New type chemically bonded silica brick with low porosity and greater density than other silica brick. It is more refractory and has excellent expansion properties to insure superior service life.

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**HIGH TEMPERATURE VERMICULITE INSULATION**

***COATING.*** An insulating cement for application as a plastic on furnace brick-work exposed to temperatures up to 2000°F.

***BRICK.*** Molded vermiculite brick used for back-up insulation. Provides a strong, resilient cushion which absorbs expansion of refractory brick-work without disintegration.

***L. B. BLOCK.*** Pressed block with high insulating efficiency and unusual structural strength for use up to 1900°F.

***CONCRETE.*** A prepared structural material containing vermiculite, Lumnite cement bond and specially selected refractory aggregates.

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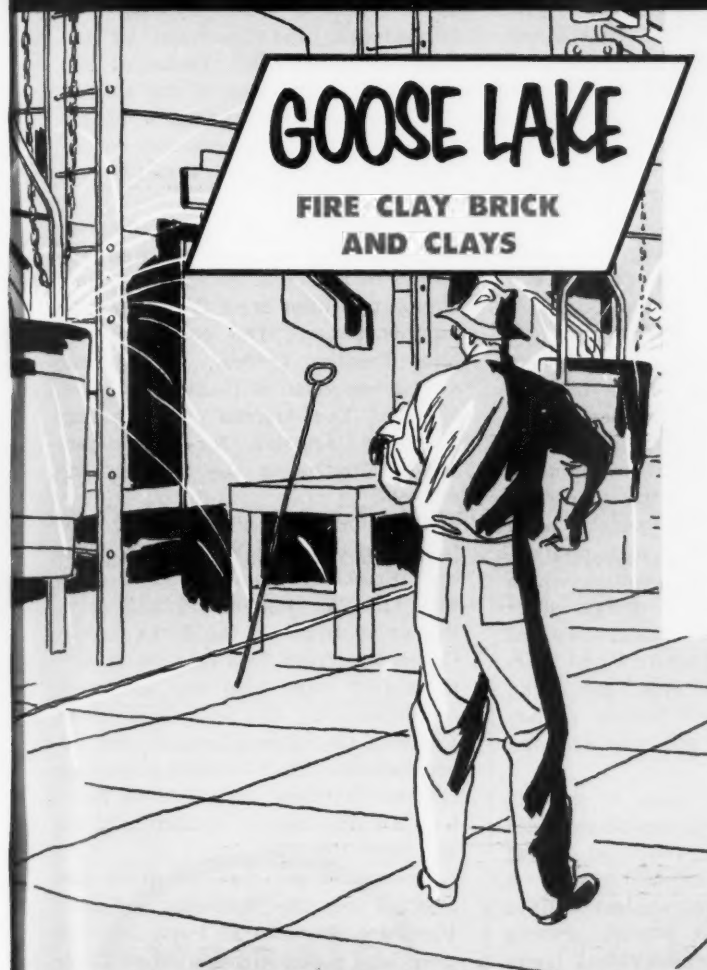

## GOOSE LAKE

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***GROUND FIRE CLAY.*** A smooth, high quality, plastic fire clay with low shrinkage for laying up fire brick and other fire clay refractories.

***FIRE CLAY FLOUR.*** Extra fine preparation of clay for laying up the brick with tight joints and for molding sand bond.

***GRUNDITE BOND CLAY.*** Special bond clay containing "Illite," a mineral, that improves molding sands for malleable and gray iron castings.

***FIRE CLAY BRICK.*** Dense, well-burned plastic fire clay brick for iron and steel ladles, cupolas and for general intermediate heat duty requirements.

***FIROX CUPOLA MIX.*** New type mixture for lining cupolas and ladles by gun or hand application.

***CASTABLES.*** Refractory grog with hydraulic bonds for use as a concrete.

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Society President A. J. McDonald, right, presents awards for outstanding services to the industry. Left to right are: Glenn R. Hughes, Ohio Steel Foundry Co.; Earle M. Layman, General Steel Castings Corp.; Frank X. Hohn, Scullin Steel Co., and R. C. Wood, Minneapolis Electric Steel Castings Co.

production, such as at present, the industry cannot afford to become complacent. Forward planning frequently can be done best in a collective manner, and that is exactly what the SFSA is trying to do.

Mr. Donaldson pointed out that the society is contributing to the search for diversification and greater castings business. The Technical & Research Committee has set up a five-year program, the Advertising, Public Relations and Education Committee has a long-range plan, and the Product & Market Development Committee is enlarging its program and providing long-range planning. The society recently embarked on a program of market research, and other studies are being made which will be of inestimable value in the future.

Charles W. Briggs, technical and research director, pointed to organizational changes now going on in the industry. The operations executive needs to be augmented and supplemented with personnel and safety men, foremen and production assistants, and inspectors, engineers and metallurgists. Directing and supervising their efforts can best be done by employing the task force principle, in the opinion of Mr. Briggs.

Many steel foundries today have at least one task force, namely the planning committee, consisting of the superintendent, patternmaker, a standards or similar production man, the metallurgist and often the chief inspector. The principal task is to lay out a pattern for production and to picture the casting in completed form, taking into consideration the operating problems. Mr. Briggs has observed that such a task force has operated to considerable advantage and he recommended that steel foundries consider task groups on heading and gating, sands, equipment and maintenance and quality improvement. In his opinion, the task force plan is a way to collect ideas and a motivation for the actual development of these ideas in the foundry.

George K. Dreher, secretary, outlined the work of the society in helping the individual salesman make the final sale of a casting. Efforts include co-operation with engineering schools in helping the young engineer understand the use of steel castings, development and publication of an industry booklet which now is in the planning stage, staging of sales clinics, distribution of the newly initiated product and market development letter, furthering lectures and papers before professional engineering societies and numerous others.

Mr. Dreher also spoke of product design studies and mentioned that these would be expanded on a test basis during the coming year. A product development contest will be forthcoming which should provide benefits within the individual member plants and in strengthening customer relationships.

These talks provided the material for a panel discussion that afternoon.

The luncheon on the first day was devoted to the presentation of medals and the introduction of the president-elect. The Technical and Operating medal of the society was awarded to Robert C. Wood, president, Minneapolis Electric Steel Casting Co., Minneapolis, and chairman of the 1953, 1954 and 1955 Technical and Operating Committee of the society, for his successful guidance of his committee programs and his contributions to the national T and O conferences.

The first Gustav A. Lillieqvist *Steel Foundry Facts* award was presented to Frank X. Hohn, chief metallurgist, Scullin Steel Co., St. Louis, for his paper, "The New Look in Heat Treating Cycles." The second award was given to Harry Dok, plant engineer, Los Angeles Steel Casting Co., Los Angeles, for his paper, "Smog Control in the Foundry Industry."

A special certificate of merit was presented to Earle M. Layman, General Steel Castings Corp., Granite City, Ill., for his outstanding services as chairman of the SFSA Safety Committee from 1953 to 1956. A certificate of merit also was presented to Glenn R. Hughes, Ohio Steel Foundry Co., Springfield, O., for his services as chief of the Castings Branch, Business and Defense Services Administration, Washington, for the year 1955-56.

Announcement was made of the election of the following officers: President, Howard F. Park Jr., vice president, sales, General Steel Castings Corp., Granite City, Ill.; vice president, George W. Myers, president, Crucible Steel Casting Co., Milwaukee; treasurer, Royal G. Parks,

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treasurer, National Malleable & Steel Castings Co., Cleveland. New directors are as follows: Division 1—M. G. Moore Jr., president and treasurer, Empire Steel Castings Inc., Reading, Pa.; Division 3—J. M. Kincaid Jr., president, Kincaid-Osburn Electric Steel Co. Inc., San Antonio, Tex.; Division 5—Ralph A. Thompson, vice president and secretary, Electric Steel Castings Co., Indianapolis; Division 7—W. H. Muchnic, chairman of the board, The L.F.M. Division, Rockwell Mfg. Co., Atchison, Kans.

A discussion, "Training Sales Engineers for Engineered Products," by John Gammell, director of graduate training, Allis-Chalmers Mfg. Co., West Allis, Wis., was introduced by a motion picture, "The Steam Turbine," produced by that organization as a means of presenting problems to engineering students. Mr. Gammell pointed to the present shortage of engineers and stated that those who are able to hire the young graduates are fortunate. To fill the gap, especially in the field of sales, companies are hiring liberal arts students and many are found exceedingly capable for that work.

### Proper Training Is Vital

Any young man coming into the plant should be given a training course which will really make him work. It is necessary to take time, effort and money to provide this training. If the young man really has the stuff, management should challenge him, or he will leave for some other organization that can provide the challenge. The speaker stressed the fact that most young men want to learn and grow. In conclusion, Mr. Gammell described the methods used by Allis-Chalmers, indicated that the organization wishes to train the kind of people who do service selling, and stated that foundrymen should want to provide the same type of selling.

Lee C. Shaw, Seyfarth, Shaw & Fairweather, Chicago, discussed "Labor, the Government and You." Mr. Shaw described the moves made by the unions in the development of the guaranteed annual wage, and indicated that the answer to the entire problem finally will depend upon public opinion.

"Have You Tried Listening," was the subject of an interesting and inspirational talk by Wesley Wiksell, Louisiana State University, Baton Rouge, La. Mr. Wiksell said that in the matter of communications we operate at only about 20 per cent efficiency. In about 80 per cent of

the instances, our communications are distorted or misunderstood. The speaker believes that the fault lies with the fact that as manager of men, we are poor listeners. He stated that the reason why your men will not listen to you is because you have not listened to them.

Stressing the fact that listening is the No. 1 point of good salesmanship, Mr. Wiksell suggested that foremen converse with the men working for them. Many times foremen will gravitate to other foremen over the coffee cup. He suggested conferences and insisted that when you are the leader of a group, listen to what the men have to say. To listen to the men pays off in many ways, including less absenteeism, less spoilage, less grievances and greater production.

Tom C. Campbell, editor-in-chief, *Iron Age*, New York, presented an optimistic talk under the heading "Where Are We Heading?" at the second luncheon session. Mr. Campbell believes that a number of factors, including construction, auto production and capital goods demand are sufficiently better so that in the last half of the year we will enjoy better business than has been predicted. He also indicated that labor and the steel industry would agree to terms and thus avoid a strike, in his opinion.

Another film shown during the meeting was entitled "The World That Nature Forgot" and was prepared by Monsanto Chemical Co. as a means of relating to the public the fascinating story of the chemistry behind the development of plastics.

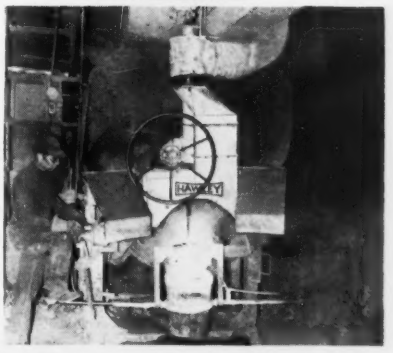
## Small Business Management Aids Are Consolidated

Small Business Administration has consolidated 21 numbers in its *Management Aids for Small Business* series in a single permanent volume now available to the public. Typical numbers include "Loan Sources in the Federal Government," "Sound Pricing Policy in Bidding on Government Contracts," "Sales Forecasting for Small Business" and "Materials Control for Small Plants."

The volume is called *Management Aids for Small Business — Annual number* 2 and contains Nos. 32 through 52 in the series. It can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. for 55 cents. The first 31 in the series were consolidated in *Annual number* 1, published in January, 1955.


# The Second Hawley Fume Control Installation for NIBCO

On merits of first installation a second unit (shown) was purchased for another brass foundry of this firm. Fumes controlled at furnace, completely through mold pouring. Only 6500 c.f.m. required for this 23' x 146' building. There's a Hawley Fume Control System to solve your problem. Revolutionary principle—no other system like it. Ask for list of users. Send for Bulletin 555.

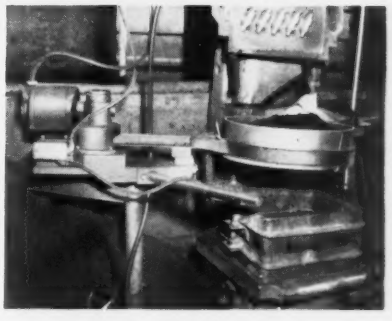


(Photos courtesy of Northern Indiana Brass Co.)

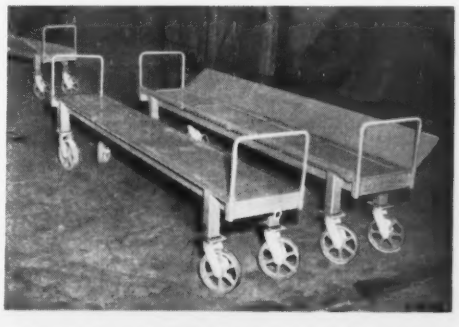
# Two NEW Hawley Cost Cutters!

## Hawley RAPID-RIDDLE

Fast, non-destructive motion that reproduces action of riddling by hand. Finer facing sand is possible. Increases production up to 35%. Electrically powered. Completely sealed, dustproof motor and switch. Swings out of way when not in use. Easily installed adjustable tripod stand. Moderately priced. Minimum maintenance. Dozens of units operating successfully. Send for details.



## Hawley MOLD TRUCK

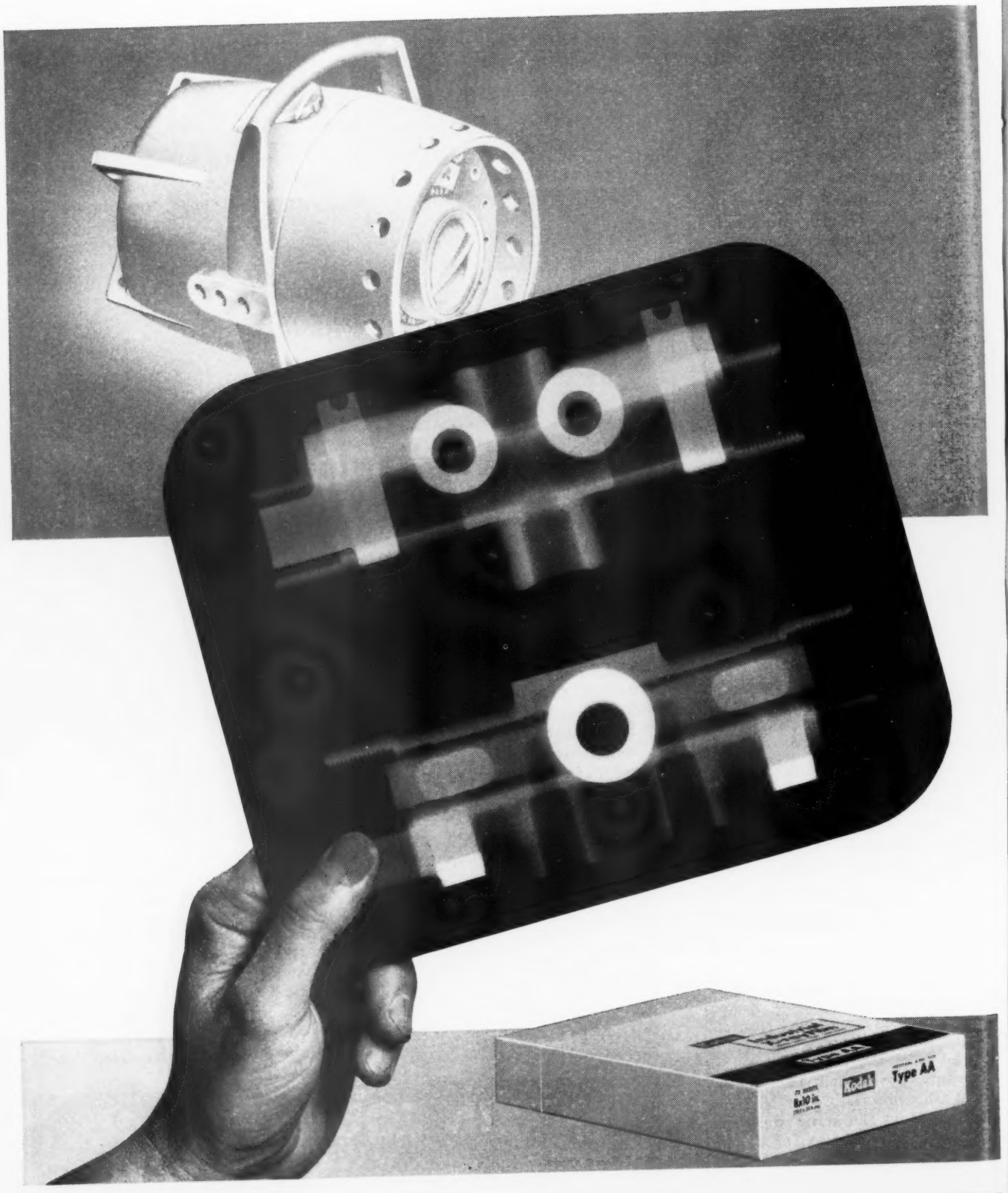


For transporting molds to ventilated pouring station. Handles six 18" sand molds sideways—five molds endways. As many as 30 shell molds. Sloping rack for staggered stacking of shell molds. Sand placed on floor of truck for insulation. Rack clamps on; lifts off easily. 10" swivel casters. Truck cannot upset. Height adjustable. Send for details.

**MARTIN EQUIPMENT CO.**

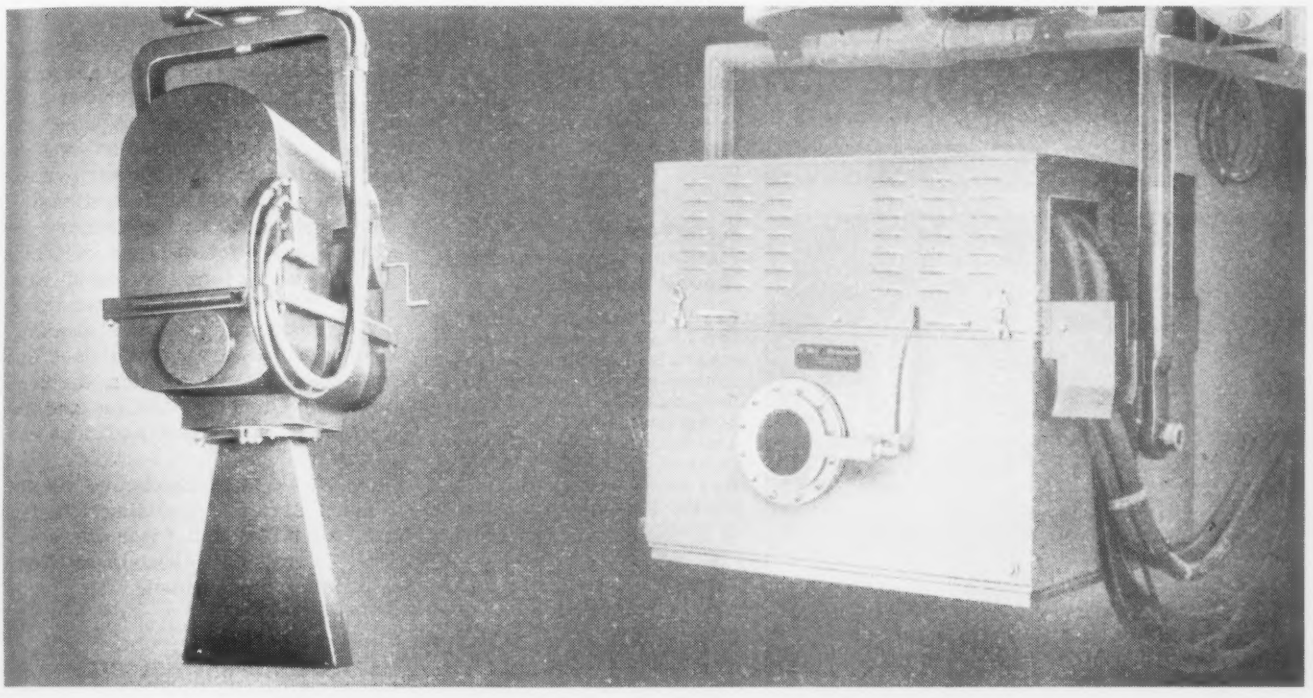
BOX 173 • WABASH, INDIANA

# Now! A great new



# X-ray Film

## specifically designed for Today's Radiographic Advances



## Kodak Industrial X-ray Film, Type AA

Out of the Kodak Research Laboratories comes a new and improved x-ray film designed to work hand-in-hand with today's other advances in industrial radiography. It is a film that retains the fine sensitivity characteristics which have made Kodak Type A the most widely used x-ray film in industry.

But more, while retaining these characteristics, the new film gives you greatly increased film speeds—speeds ranging up to more than twice the speed of Type A. So we have named this new film Type AA.

All through your radiographic operations this film will provide finer work, faster. Its characteristics and possibilities are particularly outstanding when working with today's higher k.v. x-ray machines and gamma ray sources.

Your x-ray dealer and the Kodak Technical Representative are ready to tell you about this new film. Get in touch with them to see how much this great new film is going to mean to you.

**Read what the new Kodak Industrial X-ray Film, Type AA, will do for you**

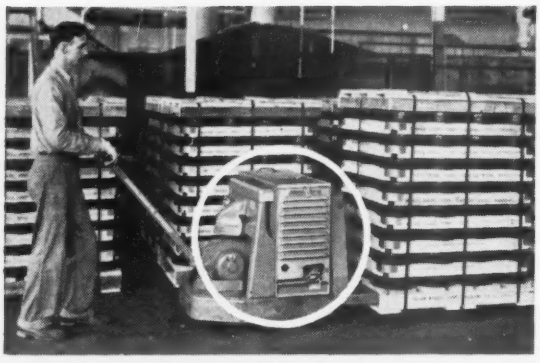
- Reduces exposure time—speeds up routine examinations.
- Speeds up processing cycle with existing exposure technics.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Reduces the possibility of pressure desensitization under shop conditions of use.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N.Y.

Kodak
TRADEMARK

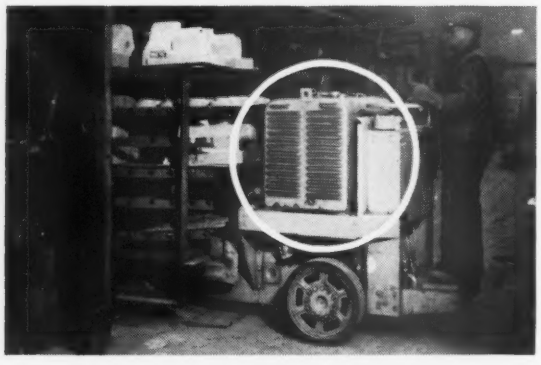

For more information, use Reader Service Card, page 347

# Get the Advantages of READY-POWER on Your Electric Industrial Trucks



**Get Live Power for Walkie Trucks**

Ready-Power's popular bantam model "W" is equipped with dependable 12-volt automotive-type starting and ignition. Variety of idling speeds and easy accessibility make it ideal for all walkie trucks as well as rider trucks up to 2,000 lbs.

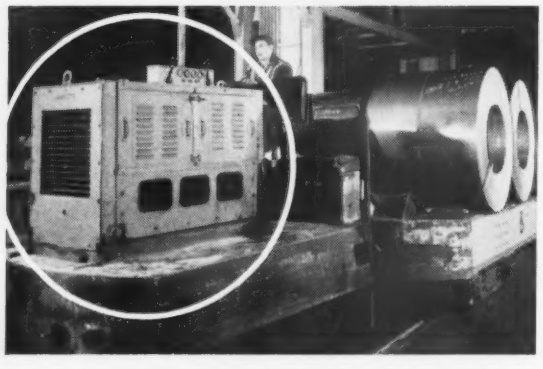


**Work Your Fork, Platform, Tractor Trucks 'Round the Clock**

Ready-Power gas-electric and LPG-electric units give materials handling trucks continuous, full power all the time. Slowdowns due to power fatigue are eliminated. The simple, all-electric control and live response make Ready-Power-equipped trucks rate high with truck operators.

**Energize Lift Magnets on Your Electric Trucks**

In the application shown at the left, the Ready-Power unit not only powers the truck, but also energizes the lift magnet for handling scrap metal. Ready-Power units are removable for shop adjustment while a spare keeps trucks working.



**Get Diesel Electric for Lowest Ton-Mile Costs**

Take a tip from the owners of industry's biggest trucks . . . power them with Ready-Power diesel-electric for maximum stamina, dependability, and lowest operating costs. Ready-Power offers power for every size and make of electric truck.

*Your Truck is No Better than its Power . . . Write for Information on Ready-Power gas-electric, LPG-electric, and Diesel-electric Units*

**READY-POWER**

**The READY-POWER Co., 3819 GRAND RIVER AVE., DETROIT 8, MICH.**

*Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks*


## AFS Publishes Book on Health, Comfort and Ventilation

Health, ventilation and comfort in both large and small plants is the subject of a new book, *Engineering Manual for Control of In-Plant Environment in Foundries,* prepared as a project in the AFS safety, hygiene and air pollution control program.

The volume contains both the general background information and specific design data for making foundries a better place to work. It discusses materials and processes that influence health ventilation and comfort and identifies their characteristics. Ventilating systems are described generally and then specifically, with data for the design of exhaust hoods and exhaust systems.

Particular problems in foundry operations are discussed and remedies offered in chapters that cover sand handling, molding and coremaking, melting, pouring, radiation, cleaning, welding, woodworking and dust and fume collectors. In addition, the book covers maintenance, testing and inspection of ventilation and dust collecting systems.

The 8½ x 11-in. casebound volume totals 152 pages, including 221 figures, 25 tables and numerous equations. Price is $6 to society members and $7.75 to nonmembers.

## Two Government Research Reports Aid Statisticians

Two reports of government-sponsored research designed to aid statisticians in lot plot sampling, quality control and general industrial statistics have been released to industry through the Office of Technical Services, U. S. Department of Commerce, Washington 25.

*Some Practical Aspects of the Lot Plot Sampling Acceptance Plan* (PB 111750) is by W. Grant Ireson. It contains 39 pages and costs $1. *Random Normal Deviates* (PB 111875), by H. A. Meyer, E. J. Lytle Jr. and L. S. Gephart, contains 122 pages and costs $3.25.

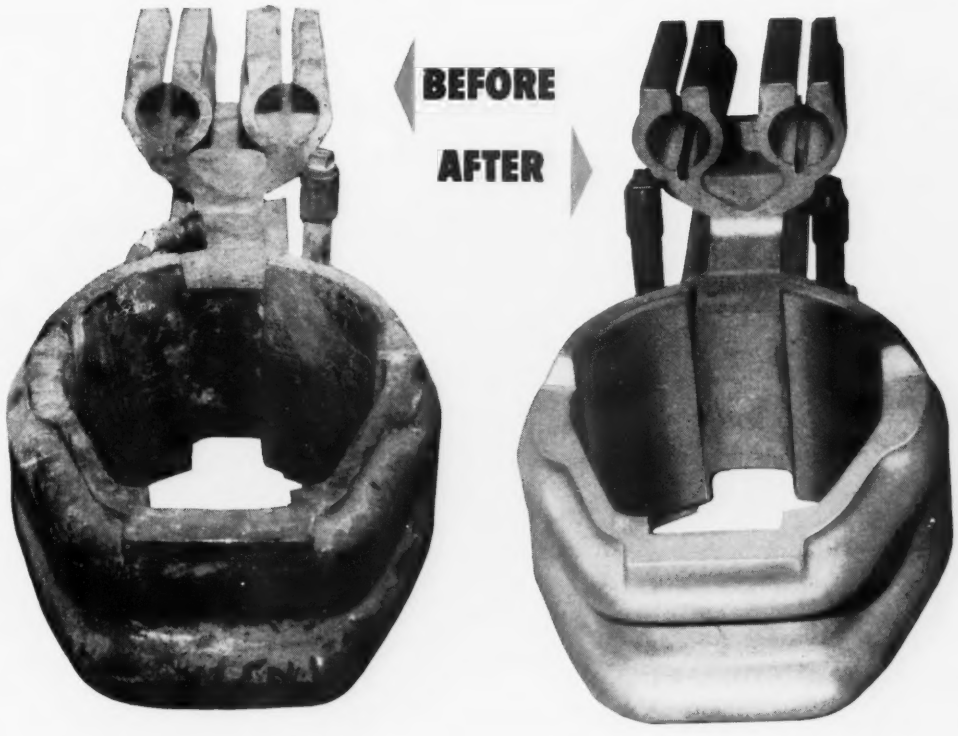
## Peerless Foundry Celebrates To Mark 50th Anniversary

More than 250 persons attended a 50th anniversary celebration of Peerless Foundry Co., Elmwood Place (Cincinnati), O., on Mar. 18. Stephen F. Dana, president and son of the late George F. Dana, founder of the company, described accomplishments of the firm during the last 50 years.

Pins were presented to 140 employees with 5 to 35 years of service

# *Rebuild* ELECTRODE HOLDERS

## *at a fraction of replacement costs...*




Costly electrode holders, bus tubes and cable clamps no longer need be discarded when they become badly burned, pitted or scarred. These pieces of equipment may be restored to a condition corresponding to the original drawings and specifications at a fraction of the cost of a replacement unit. Wilson Welding Company's new method, using a patented process of fusion welding of copper and copper alloy, now makes possible the repair and rebuilding of holders, bus tubes, bus bars or other burned or damaged copper component parts on all types and makes of electric arc melting and smelting furnaces.

The photographs above show, in a graphic manner, the results obtained from an electrode holder so badly damaged that it was thought to be unsalvageable.

Repair prices are based upon the amount of labor and material cost involved.

All repair work is guaranteed to produce a finished product comparable in every respect to the original.

Your inquiry will receive prompt attention.

W W CO INC

## Wilson Welding Company, Inc.

**COPPER AND COPPER ALLOY WELDING**

221 HIGH STREET
ALTIZER ADDITION
BOX 1634
HUNTINGTON
WEST VIRGINIA



*For more information, use Reader Service Card, page 347*

# How Norgren AUTOMATIC-DRAIN Air Line Filters REDUCE WEAR On Air-Equipment

## . . . End cost of manual draining

**1 Abrasive Materials Filtered**
Abrasive materials such as grit, pipe scale and rust are automatically filtered from compressed air lines.

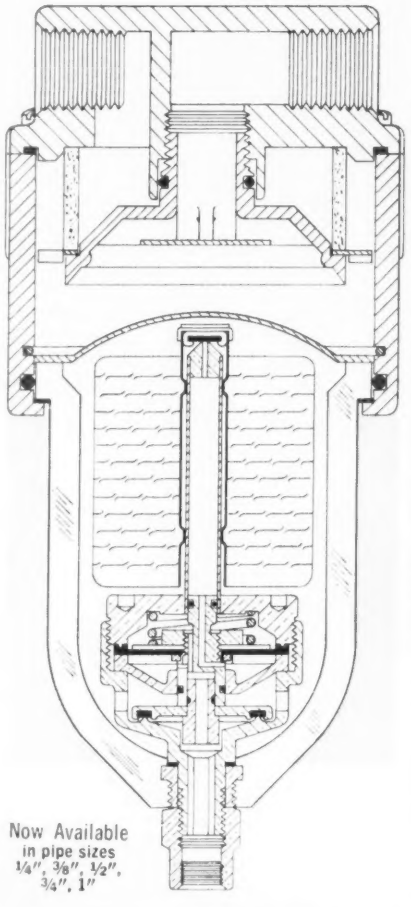
**2 Corrosive Liquids Removed**
An efficient baffle creates a strong centrifugal action that "wrings" oil and corrosive moisture from the air.

**3. Liquids Drained Automatically**
Collected liquids are automatically drained through a float-controlled, pilot-operated mechanism that discharges only when the liquid reaches a designated level, reducing air requirements, and eliminating unnecessary draining action.

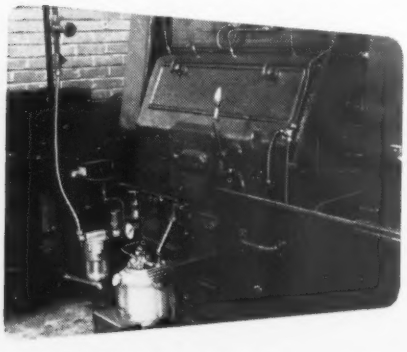
**4 Drain Independent of Air Flow**
As long as there is pressure on the system the drain operates around the clock, with or without air flow.

**5 Choice of Filters**
Standard filter is a reinforced 200 mesh Monel wire screen (74 micron). Optional filters are 64 and 25 micron sintered metal.

**6 Trouble-Free Drain Operation**
Solids are prevented from entering the drain mechanism to prevent clogging and assure trouble-free operation. A transparent bowl provides a clear view of liquid accumulation and the drain action.



Now Available in pipe sizes ¼", ⅜", ½", ¾", 1"



**Here, an automotive electrical equipment manufacturer** uses Norgren MICRO-FOG to completely lubricate a ⅝" multiple spindle automatic screw machine. On this machine and on many others in the plant, a Norgren Automatic-Drain Filter protects regulator, lubricator, gears and bearings by removing abrasive solids and corrosive liquids from the air line system.

Without obligation, learn how Norgren Automatic-Drain Air Line Filters can reduce costs in your plant. Call your nearby Norgren Representative listed in your telephone directory—or **WRITE THE FACTORY FOR NEW No. 700 CATALOG.**

C A Norgren CO

3451 So. Elati St., Englewood, Colo.

*Wherever Air is Used in Industry*


with the company, and talks were made by Murat H. Davidson, vice president, and Paul H. Brinker, personnel director. The program was concluded with a buffet luncheon.

Peerless Foundry is located at 5648 Vine St. It produces gray iron castings and normally employs about 200 persons.

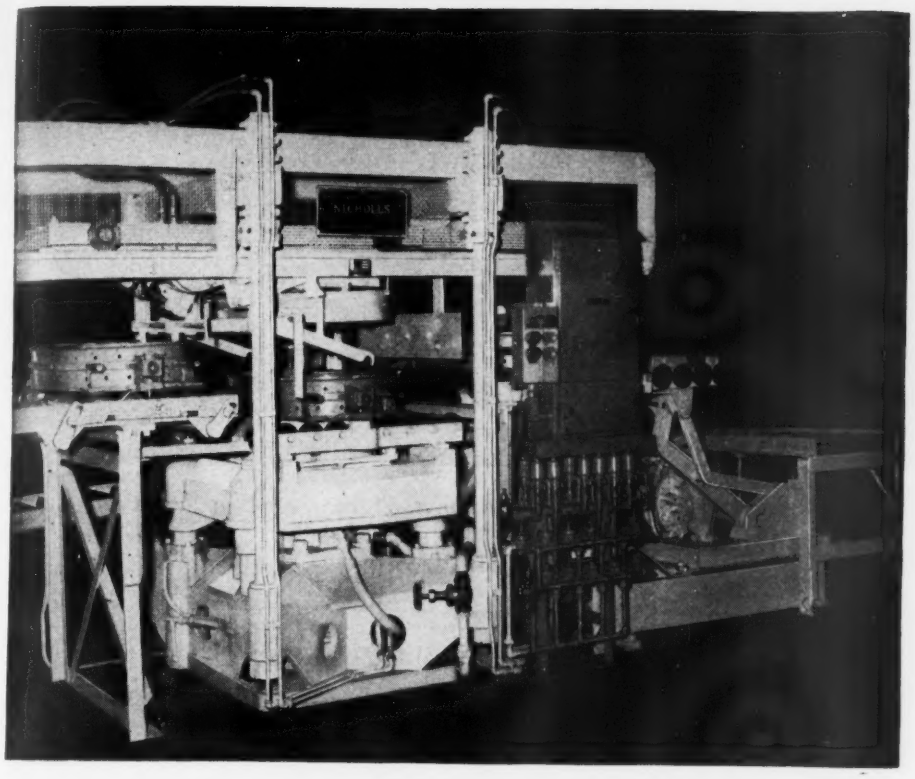
## 1955 Book of ASTM Standards Is Ready for Distribution

American Society for Testing Materials has completed and published its largest triennial *Book of ASTM Standards*. The 1955 edition has over 11,000 pages and includes more than 2150 specifications, tests and definitions for materials. Printed on bible-type paper, it consists of seven parts. Parts 1 and 2 cover ferrous and nonferrous metals, respectively, including casting applications, and are priced at $13.50 and $11.

The ferrous metals section covers carbon and alloy steel, irons, ferroalloys and numerous tests. It contains 1834 pages and 315 standards, 211 of which are new or have been revised since 1952. The section on nonferrous metals includes the coppers, the leads, aluminum, magnesium metal powders and widely used test procedures. Its 1516 pages contain 270 standards, 156 of them new or revised since 1952.

Each part includes a detailed subject index and a list of standards in numerical sequence. To keep the book up to date, supplements to each part will be issued late in 1956 and late in 1957. A complete index is furnished without charge with each set of the books.

Parts of the 1955 *Book of ASTM Standards* may be purchased from American Society for Testing Materials, 1916 Race St., Philadelphia 3. Cost of the entire set of seven parts is $84.



See
this machine
in operation
at
Convention Hall
Atlantic City
Booth 1821

No. 21 Type C. F.—Jolt, Squeeze and Pattern Draw — Automatic - Push Button Control

(Also Made in Smaller and Larger Sizes)

# New "Push-Button" Operation Takes The Guesswork Out of Molding

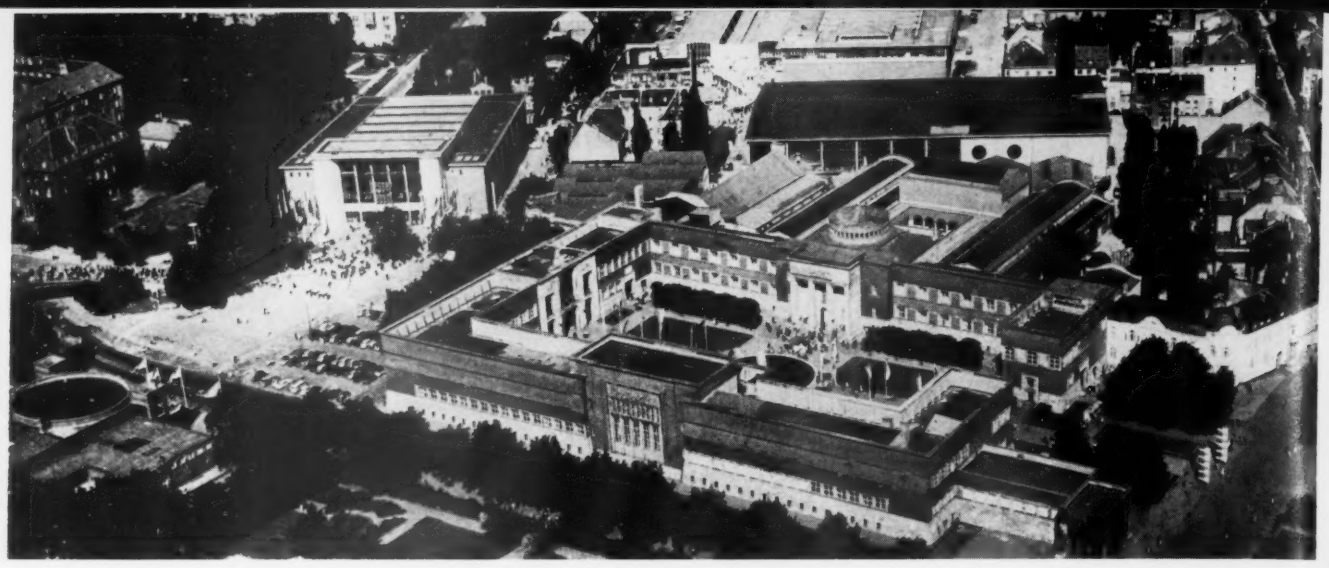
From start to finished mold, the Nicholls #21 Type CF Jolt, Squeeze and Pattern Draw Molding Machine is push-button controlled to eliminate dangerous risks, costly mistakes —to give you better molds *continuously*. Precision built for long years of service...made with all the safety-devices, the hidden "quality points" that reduce maintenance costs...the know-how that almost half a century of building quality molding machines has made possible. If you're interested in better quality molds at lower cost—investigate these machines now.

*For complete information, write to:*

**William H. Nicholls Co., Inc.**

**Richmond Hill 18, Long Island, New York**

# NICHOLLS



Fair grounds at Dusseldorf, Germany, will be site of the 23rd International Foundry Congress and the first International Foundry Trade Fair, Sept. 1 to 9

## Large Trade Fair Planned During

# International Foundry Congress

FOR the first time in 20 years, the International Foundry Congress this year returns to Germany, where, as in 1936, the meeting will be held in Dusseldorf, historic city on the Rhine, Sept. 1-9, under the auspices of the International Committee of Foundry Technical Associations.

The congress will be organized by the German Foundrymen's Association, the *Verein Deutscher Giessereifachleute*. At the same time, the first International Foundry Trade Fair (GIFA, from the German initials) will be held, in conjunction with the congress.

Technical papers will be given on two days, Sept. 5-6, and simultaneous translation installations will be provided to reach as wide a number of hearers as possible. On Sept. 3, 4 and 7, plant visitations will be offered during the day, with special events in the evenings. The works to be visited include some 25 gray iron, steel, malleable and nonferrous foundries in the vicinity of Dusseldorf. In addition, an all-day trip by special train to the Volkswagen Works is planned for Sept. 4. Special programs will be offered daily for the ladies.

Following the congress, three sightseeing trips will be available. All three will leave Dusseldorf by special train on Sunday, Sept. 9, and they will end on Sept. 15. Each trip will include visits to plants for the men and separate programs for the ladies. Two of these tours will terminate in Stuttgart and the third in Mannheim.

Sept. 1 will be devoted to the opening of the congress, and a Rhine tour to Rudesheim will be offered on Sunday, Sept. 2. The trip to Rudesheim will be by train and the return will be by boat, through the most beautiful part of the Rhine valley, past vineyards, old castles and ruins, the Lorelei Rock and medieval towns. On Sept. 8, the congress will close officially.

The International Foundry Trade Fair has been organized by the *Verein Deutscher Giessereifachleute* (VDG) and the *Wirtschaftsverband Giessereiindustrie* (WGI), together with the *Fachgemeinschaft Giessereimaschinen im VDMA* and the *Gesamtverband Deutscher Metallgiessereien* (GDM). Site of the fair, like that of the congress, will be the fair grounds at Dusseldorf, which are comprised of six large buildings with a total of 42,000 square meters of exhibition space. Exhibits will be of four types—foundry products, foundry machinery and plant, raw and auxiliary materials for foundries, and technical, scientific and historical special exhibitions. Exhibitors will include firms from other European countries and from abroad. Austria, Belgium, France, Holland, Italy, Luxemburg and Spain will have special exhibits at their own national pavilions.

The preliminary program follows:

**PRELIMINARY PROGRAM**

**Saturday, Sept. 1**

9-10:30 a.m.—47th meeting of members of VDG*
11 a.m.-1 p.m.—Opening of 23rd International Foundry Congress and of the GIFA, at the Rheinhalle
6 p.m.—Reception by Lord Mayor of Dusseldorf, at Benrath Castle*

**Sunday, Sept. 2**

9 a.m.-9 p.m.—Rhine tour to Rudesheim

**Monday, Sept. 3**

9 a.m.-4 p.m.—VDI and VDG lectures: *Design and Casting*
1:30-6 p.m.—Plant visitations
2-4 p.m.—Meeting of International Committee on Foundry Defects*
4-6 p.m.—Meeting of International Committee for the Technical Dictionary of Foundry*
7 p.m.—Reception of delegations of individual countries by chairmen of the VDG and WGI*
8 p.m.—Dinner of the International Committee and their ladies*

**Tuesday, Sept. 4**

7 a.m.-10 p.m.—Special trip to Volkswagen Works at Wolfsburg
9 a.m.-6 p.m.—Plant visitations
2:30-6 p.m.—Meeting of the International Committee on Testing Cast Iron*
8 p.m.—Variety evening

**Wednesday, Sept. 5**

9:30 a.m.-1 p.m.—Lectures (8) in two halls
3-6 p.m.—Lectures (6) in two halls
6 p.m.—Reception by the chairman of the Dusseldorf Chamber of Commerce and Industry*
7 p.m.—Beer evening in the 100-year old brewery cellar of the Dieterich Brewery

**Thursday, Sept. 6**

9:30 a.m.-1 p.m.—Lectures (8) in two halls
3-6 p.m.—Lectures (6) in two halls
8 p.m.—Symphony concert, at the Rheinhalle

**Friday, Sept. 7**

9 a.m.-6 p.m.—Plant visitations
3-6 p.m.—Meeting of the International Committee*
7 p.m.—Reception by the chairman of the International Committee, at the Rheinhalle*
8 p.m.—Congress banquet, at the Rheinhalle

**Saturday, Sept. 8**

10:30 a.m.-1 p.m.—Official closing ceremony of the congress, at the Rheinhalle

**Sunday, Sept. 9**

9 a.m.—Commencement of post-congress tours

*Participation in events marked with an asterisk is by special invitation only

SPO
DEDICATED

**DEDICATED . .**

# AFTER 5,000 YEARS . . . THE SPOMATIC

As the world's first integrated fully-automatic molding system, SPOMATIC is the outstanding development to date in the automation of mold production. For 5,000 years, since the primitive beginning of metal casting, men have worked continuously to create newer and better methods of producing uniform standard molds.

Today, SPOMATIC is the acknowledged leader in capacity, efficiency and economy. High production foundries are using SPOMATICS to streamline their operations... cut over-all costs substantially . . . improve casting quality.

If you are caught in the bind of steadily rising costs and greater competition from weldments and die-castings, investigate the capabilities of a SPOMATIC. There's nothing like it for mass producing uniform standard molds *at a profit*.

# to the development of dynamic molding equipment and techniques . . . through CREATIVE ENGINEERING

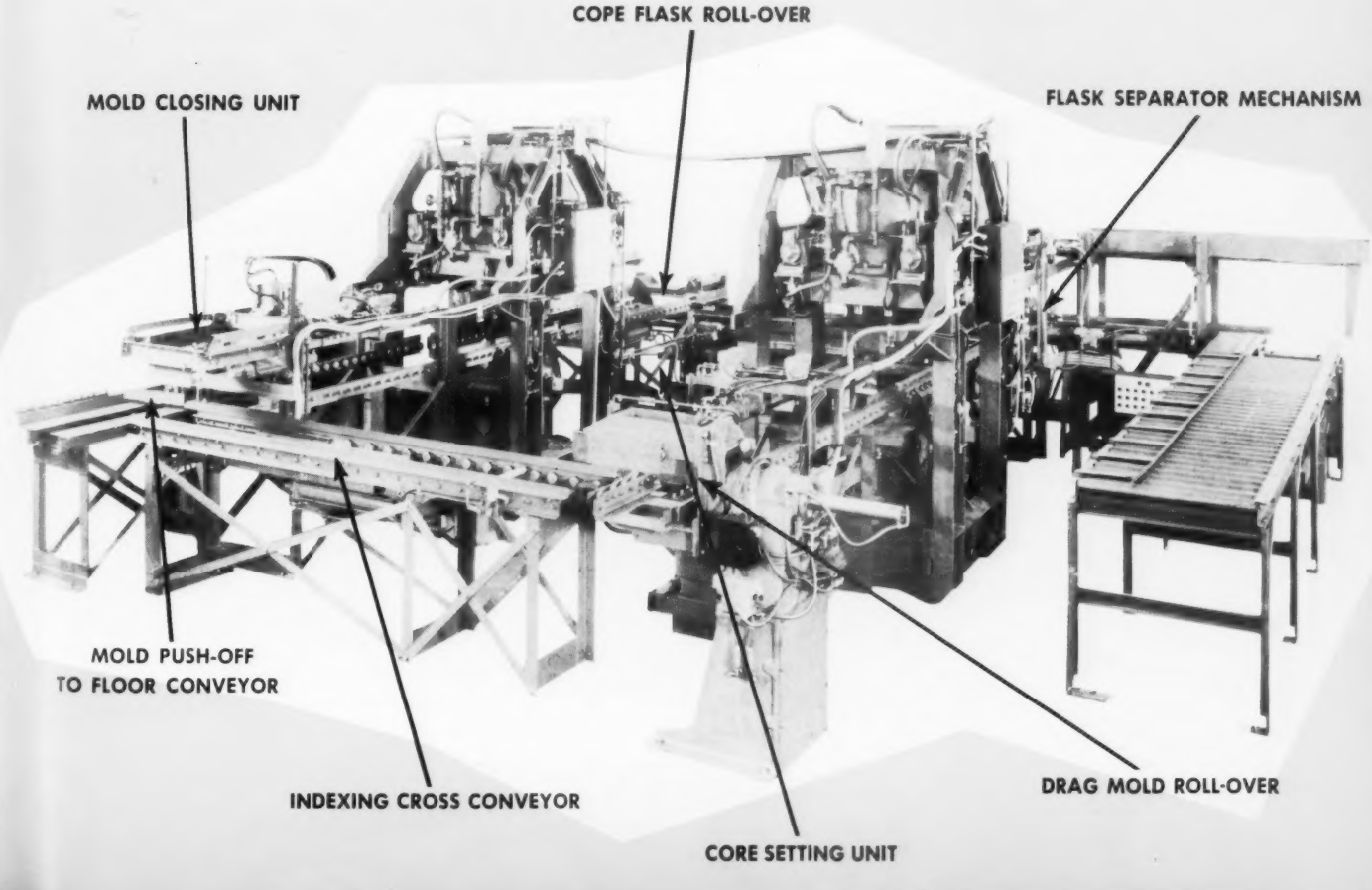
Creative engineering sets the pace of progress. It converts theories into practical applications. It is the endless search for perfection.

The priceless ability to anticipate an industry's future needs and then to develop and produce superior equipment to answer those needs . . . that is creative engineering. It is an intuitive blending of foresight, imagination, engineering knowledge and production know-how.

Creative engineering has become a tradition with SPO.

That is why SPO is the world's largest supplier of molding machines . . . and the recognized leader in the development of practical automatic and semi-automatic molding equipment.

SPO's management, design-engineering and production people are continually experimenting with new techniques to improve molding operations. These men are dedicated . . . dedicated to the search for new horizons through creative engineering.

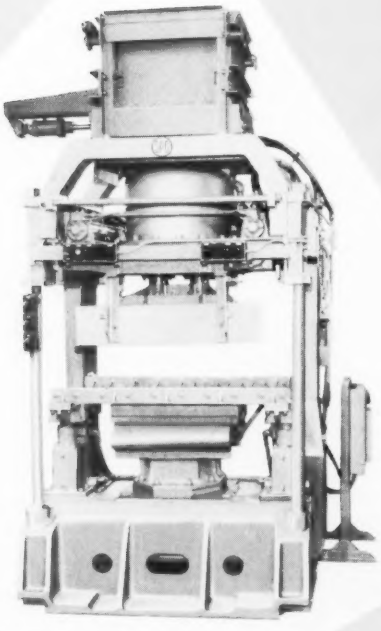


# SEMI-AUTOMATIC EQUIPMENT . . .

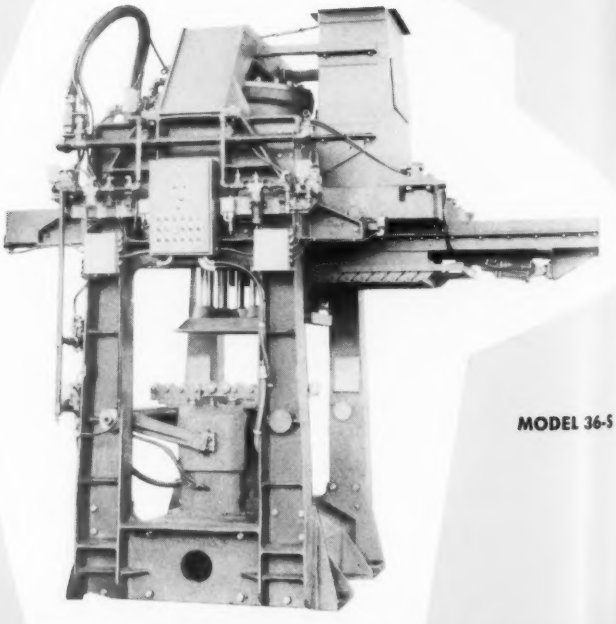
. . . has been developed by SPO for foundries whose current needs or facilities do not warrant conversion to fully-automatic machines. Designed for high-speed operation, these versatile units can be integrated into existing layouts easily and economically. They provide a substantial boost in mold production for relatively low initial investment.

In addition, when used in combination with SPO special flask and mold handling equipment, these semi-automatic machines will provide varying degrees of automation to meet individual requirements. They also will serve as the nucleus for later conversion to fully-automatic molding.

Featuring speed, simplicity and safety, SPO semi-automatic molding machines fulfill the urgent need of many foundries for faster production at lower cost.



MODEL 2[illegible]02



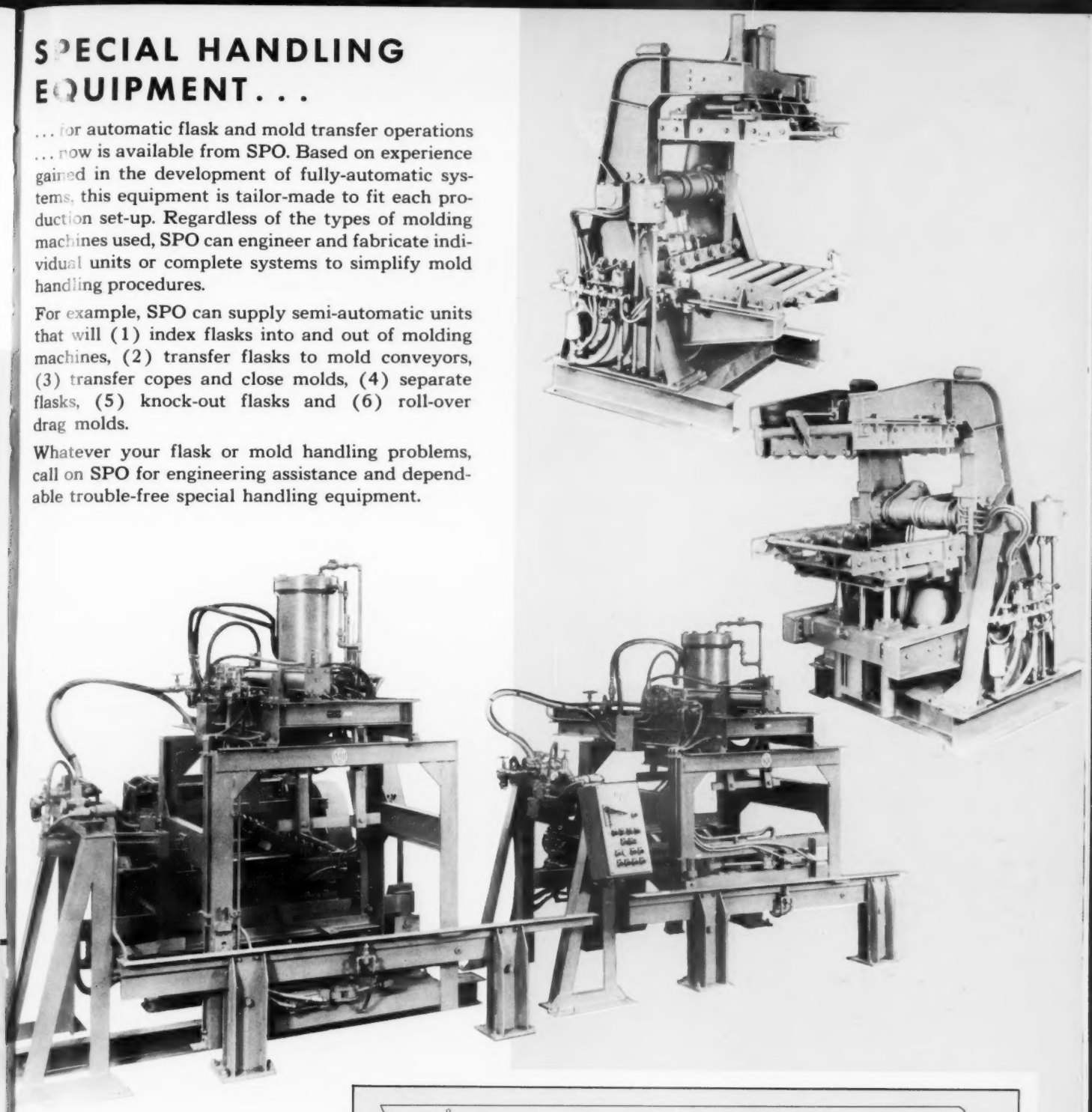
MODEL 36-S

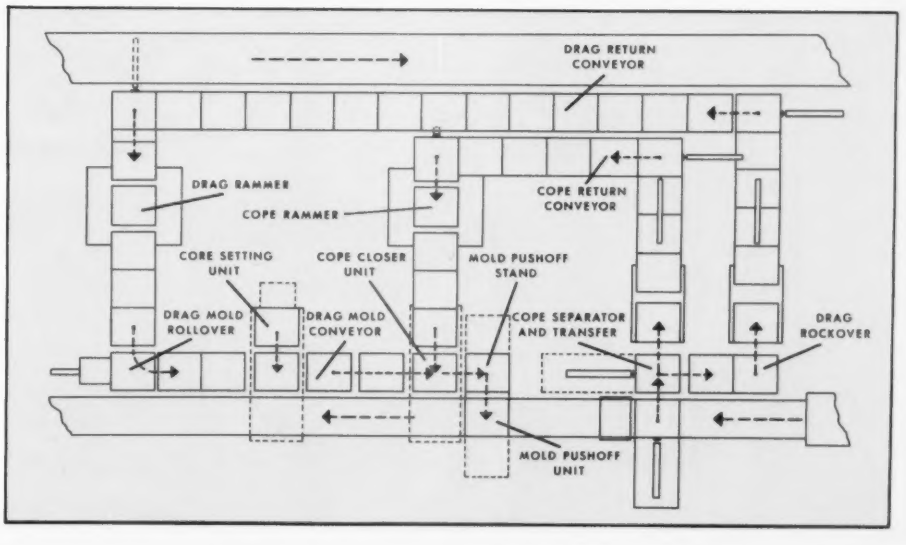
# SPECIAL HANDLING EQUIPMENT . . .

. . . for automatic flask and mold transfer operations . . . now is available from SPO. Based on experience gained in the development of fully-automatic systems, this equipment is tailor-made to fit each production set-up. Regardless of the types of molding machines used, SPO can engineer and fabricate individual units or complete systems to simplify mold handling procedures.

For example, SPO can supply semi-automatic units that will (1) index flasks into and out of molding machines, (2) transfer flasks to mold conveyors, (3) transfer copes and close molds, (4) separate flasks, (5) knock-out flasks and (6) roll-over drag molds.

Whatever your flask or mold handling problems, call on SPO for engineering assistance and dependable trouble-free special handling equipment.






This schematic layout shows a typical installation utilizing a variety of SPO semi-automatic handling units.

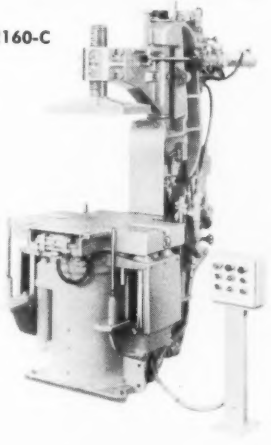
# THERE'S A SPO MACHINE FOR EVERY MOLDING JOB IN THE FOUNDRY

In spite of the glamor and interest being focused on fully-automatic equipment and systems, "standard" molding machines still are the backbone of the industry. Jobbing as well as production foundries continue to rely upon durable hard-working units like these well-known SPO machines.

SPO offers you a complete line . . . ranging from small manually-operated machines to semi-automatic push-button giants . . . to meet every molding requirement. If you are planning to replace worn-out or obsolete equipment, or if you are modernizing present facilities, specify SPO for the finest molding machines available today.

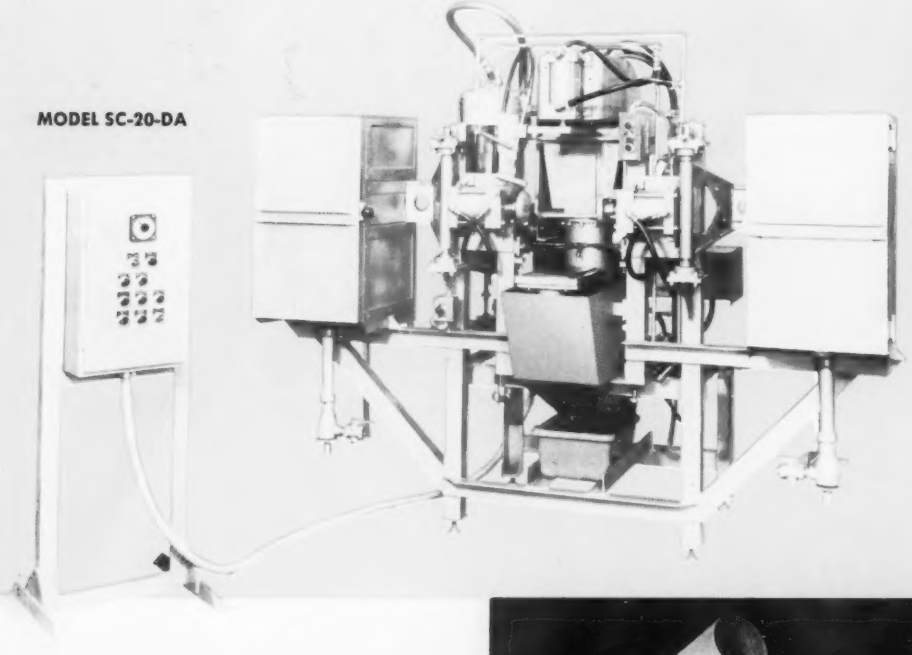
MODEL 110-J

MODEL 2160-C



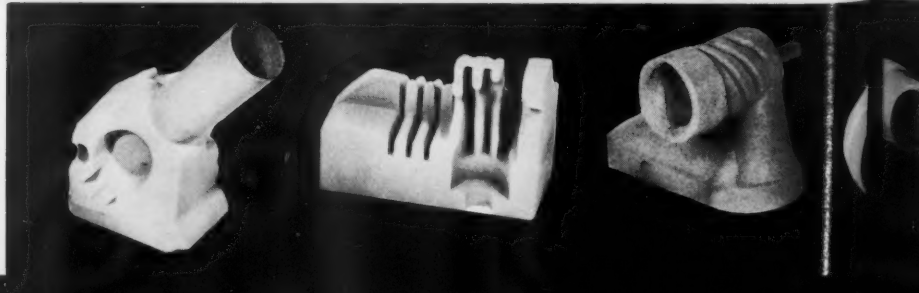
## THE NEW SPO holo-core MACHINES

MODEL SC-20-DA

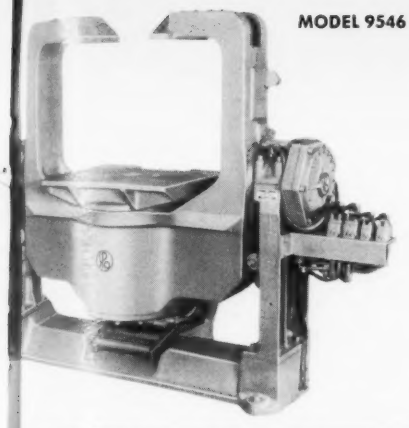


Another excellent example of SPO's creative engineering, this new line of HOLO-CORE machines develops new concepts of speed, precision and economy in core production and molding procedures. Hollow cores feature several outstanding advantages. They eliminate venting problems . . . permit faster easier shake-out . . . assure extremely close tolerances . . . require no secondary operations . . . can be mass produced by one man.

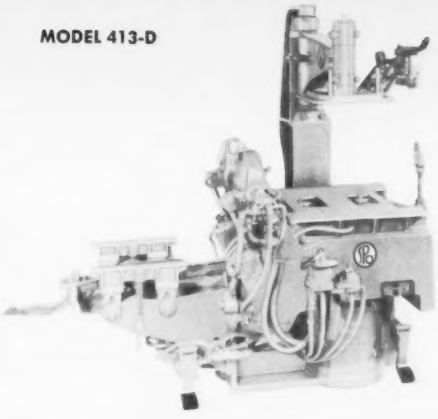
Three Holo-Core models are available to meet diversified core production needs. MODEL SC-10-D will accommodate core boxes up to 10 x 10 x 6 inches in size, while the larger MODEL SC-20-D can handle boxes measuring 20 x 16 x 6 inches. Both models can produce ready-to-use precision cores in a 45-second cycle and can be equipped with either semi-automatic or manual operating controls.



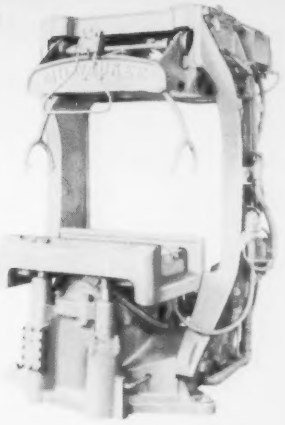
MODEL 9546



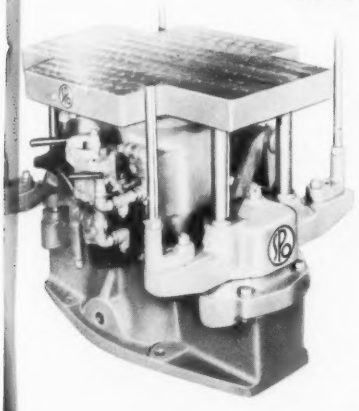
MODEL 413-D



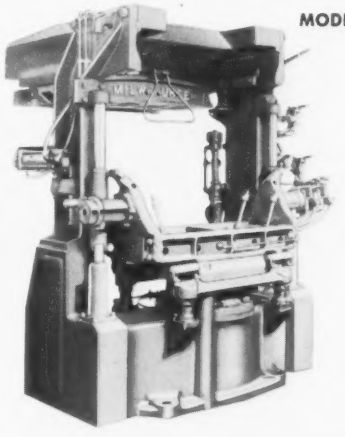
MODEL 214



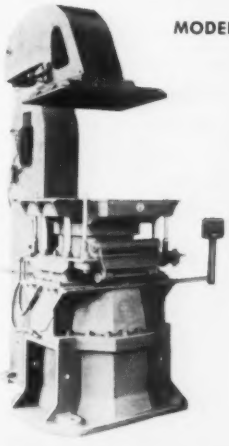
MODEL 3070



MODEL 217



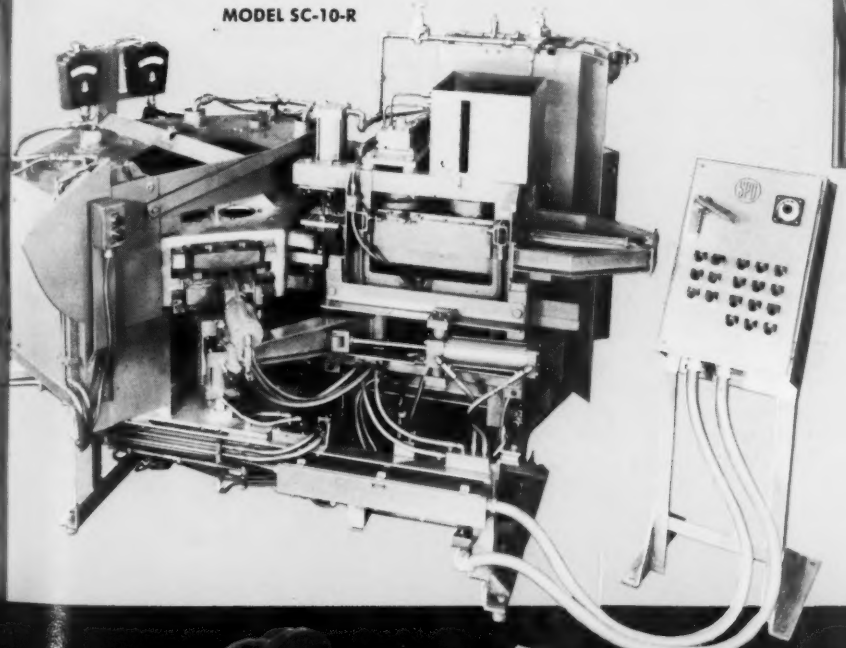
MODEL 2364

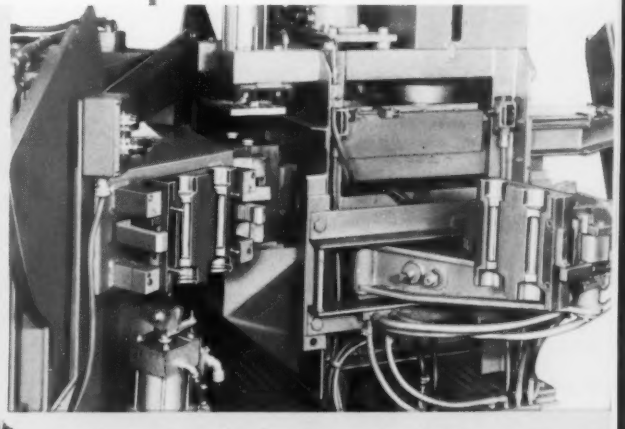


For mass-production foundries, SPO has developed the new automatic rotary-type MODEL SC-10-R. Designed to utilize six core boxes up to 10 x 12 x 6 inches in dimension, its complete cycle is 15 seconds or less.

All operations . . . except removal of finished cores . . . are automatically controlled by precision valves and electrical equipment.

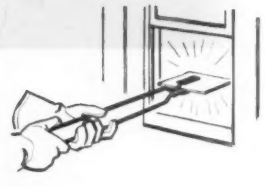
MODEL SC-10-R





This close-up, taken from the operator's station, shows a box immediately after cores were removed. While this operation is being performed, the blow head is filling the box just emptied. Four boxes containing blown cores are in curing oven.

## SPO SETS THE PACE...



. . . in the technological race for newer and better foundry molding equipment and techniques.

SPO "firsts" include the development of the maintenance-free inverted jolt mechanism . . . the fully-automatic SPOMATIC molding system and its components . . . the first practical hollow core machine . . . the self-aligning stripping mechanism . . . and the first successful application of green sand cores.

To maintain the pace it has established, SPO has made a tremendous investment in design and engineering facilities. Projects now on the drawing boards promise to revolutionize future foundry operations as drastically as some of their predecessors.

Whether you are interested in automation or modernization, SPO has the engineering knowledge and machines to help you do a better job faster and more economically.

## SPO INCORPORATED

**7100 GRAND DIVISION AVENUE • CLEVELAND 25, OHIO**
**Telephone Diamond 1-3666**

WORLD'S LARGEST SUPPLIERS
SPO
OF MOLDING MACHINES

6656-SI

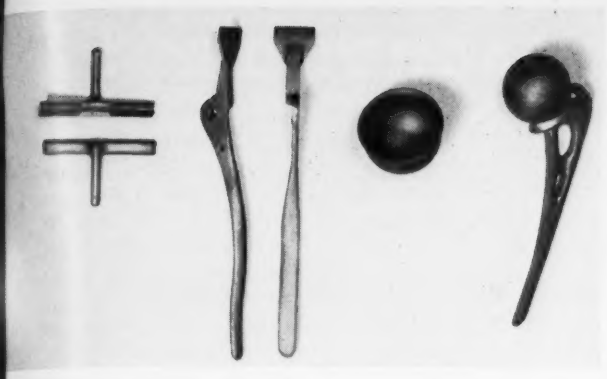


Fig. 1—Castings shown here are representative of the surgical parts made at Midwest

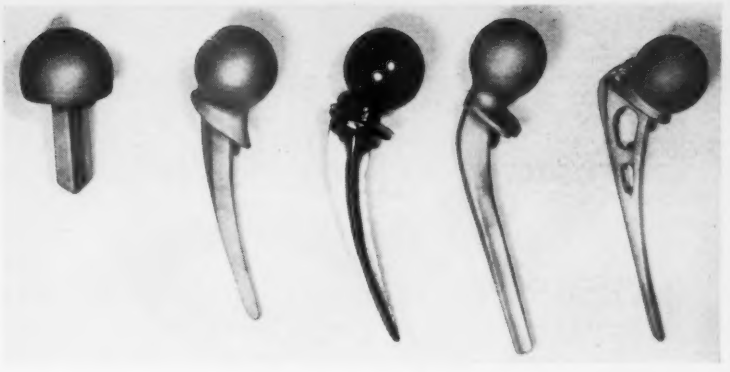


Fig. 2—View illustrates several different types of hip prostheses made as castings

# Castings for Surgery

By DAVID W. STACKHOUSE
*Design Engineer*
Midwest Foundry Co.
Coldwater, Mich.

UTILIZATION of the investment casting process in the production of parts for medical or surgical use is not new. One of the earliest modern applications was in the field of dentistry, where the lost wax process pioneered in the creation of dentures. The history of metallic surgical implants, which we are concerned with here, is, however, of considerably more recent origin.

Midwest Foundry Co., Coldwater, Mich., has for some time been involved in the manufacture of various prosthetic appliances and of components of surgical tools. Of the numerous different castings produced, those shown in Fig. 1 may be of special interest. From left to right, they are as follows: 1. Cranial traction hook, used for cervical traction. The hooks are the part of the device that makes contact with the skull. 2. Bone clamp, used to hold fractured bones in place while boneplates are being inserted; also used in the alignment of broken bones. 3. Cast spreader. This is just what the name implies—a pair of pliers used to spread plaster casts when they are being removed. 4. Hip cap, used in certain cases of malfunction in the hip joint to replace the socket portion. 5. Hip prosthesis (it might also be called femoral prosthesis), used in cases of damage or disease to replace the ball portion of the hip joint. This article is concerned principally with the hip prosthesis, and Fig. 2 shows several different types of them produced by Midwest.

Prostheses are produced in two alloys—SMO stainless steel, Type 316, and a cobalt-base alloy. These alloys are subject to the strictest controls as to composition to meet the standards set by the Joint Committee for the Study of Surgical Materials. Furthermore, these are two of the very few alloys approved by the committee for this type of orthoplasty, as this kind of surgery is called. Figs. 3 and 4 show the prosthesis installed and in use.

We can assume that the limitation to so few alloys is due to the intolerance of the flesh for almost all metals. These alloys have proved most nearly compatible; yet even they are subject to mechanochemical failure, which results from the combined action of mechanical stress and chemical attack. As a result, extreme care must be taken to assure production of sound castings with an absolute minimum of porosity and surface pitting. Any such pit or crevice is the potential source of a fracture or rupture.

With this point as a basic consideration, the prostheses have been designed for maximum elimination of sharp edges and corners which are natural locations for bubbles, cracks, fissures, burrs, etc. Even the most infinitesimal irregularity can cause a breakdown as a result of mechanochemical action. Note the smoothly blended and rounded configuration of the prosthesis which appears in Fig.

Fig. 3—View shows how hip prosthesis is installed in the femur

Fig. 4—X-ray view is similar to Fig. 3, shows prosthesis in use

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INDUSTRIAL SAND

# WEDRON
## SILICA SANDS

## Best for Foundry Use

Sand was once a pretty simple thing. You just dug it up and shipped it to people who needed it. That was O.K. some years ago, but sand like everything else has changed. High precision casting requires sands of specific grain sizing.

Wedron spends many thousands of dollars annually for new equipment, new processes, experimentation and testing for quality control.

Because of this, you're sure of *uniformity*, *purity* and *smooth rounded grains* that eliminate cutting out of core boxes.

With Wedron sand you get the right sand for every casting need:

—fine grades for shell molding

—coarser grades for standard casting methods

—blasting sand

—the finest and purest silica flour

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WEDRON SILICA COMPANY

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5. It is this same complex configuration that makes investment casting the only practical method of fabrication. Machining shapes such as these approaches the impossible, and the cost of producing parts by this method would be prohibitive. Moreover, the cobalt-base alloys are extremely difficult to machine due to the rapidity with which they work harden. Certain types of the prostheses have proved more satisfactory, both cost-wise and quality-wise, as investment castings than as production parts produced by any other method. This is especially true when it is considered that the only operation required to ready the castings for the market is "polishing." The parts are supplied as-cast with a surface finish of around 125 rms.

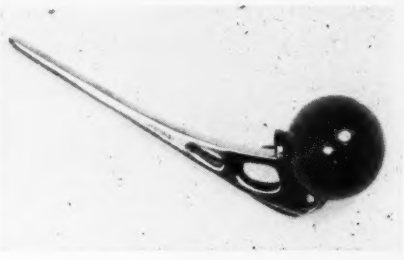

Fig. 5—Castings must be absolutely sound and regular. Note blended, rounded configuration

Our customers placed on us the further requirement of supplying castings with a hollow head, as illustrated by the sectioned prosthesis in Fig. 6. The fact that the spherical section must be hollow is an additional reason in favor of investment casting. Previously the prostheses were produced in two parts; the shank and a semisphere in one part and a mating semisphere in the other part. These were then threaded, and after assembly were permanently bonded by a brazing operation.

Midwest instigated a program of experimentation to determine the best means of casting the hollow ball. Numerous methods were explored, including soluble wax, and as a result of the program the two-casting method was reverted to as the most practical and economical. A method was devised, however, whereby the threading operation was eliminated and the procedure used to bond the two castings together produces, for all practical purposes, an integral casting—that is, a smooth sphere with no joints or other physical evidence of a parting. Furthermore, no foreign elements are introduced to the part, as would be in a brazed joint.

The castings are required to be physically strong. The cobalt-base alloy must have a tensile strength

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### FLUID T750 SERIES POWER CYLINDERS

The new Hanna T750 Series cylinders are the last word in smooth, dependable performance. These rugged, compact cylinders are built for air operation to 250 p.s.i. and oil or water operation to 750 p.s.i. Many mounting styles and interchangeable heads make these cylinders exceptionally versatile. Available in 1½", 2", 2½" and 3" diameters.

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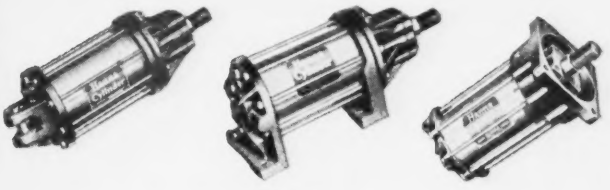
## Hanna LP
### AIR & HYDRAULIC CYLINDERS



For low pressure air and hydraulic operation. Thousands of varied applications have proved the quality and reliability of these Hanna cylinders. Bore sizes range from 4" to 14". These cylinders, combined with Hanna T750 Series cylinders, offer a complete range of cylinder sizes and mounting styles. Made in any practical stroke length.

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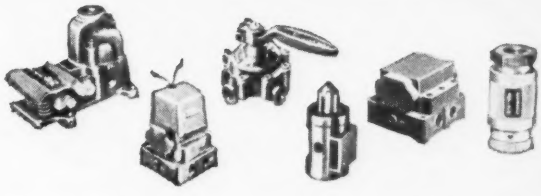
## Hanna
### AIR AND HYDRAULIC VALVES



Designed to provide most efficient control for Hanna cylinders — ideal for other fine control jobs too. Many types available for hand, foot and electric operation, speed control, pilots and master for automatic and remote control.

**Write for Catalog 254**

### Hanna Filters, Lubricators, Regulators, Traps

These accessories provide complete protection for precision-built cylinders and valves—will keep maintenance costs at a minimum.

**Write for Catalog 105**

## Hanna HP
### HYDRAULIC CYLINDERS

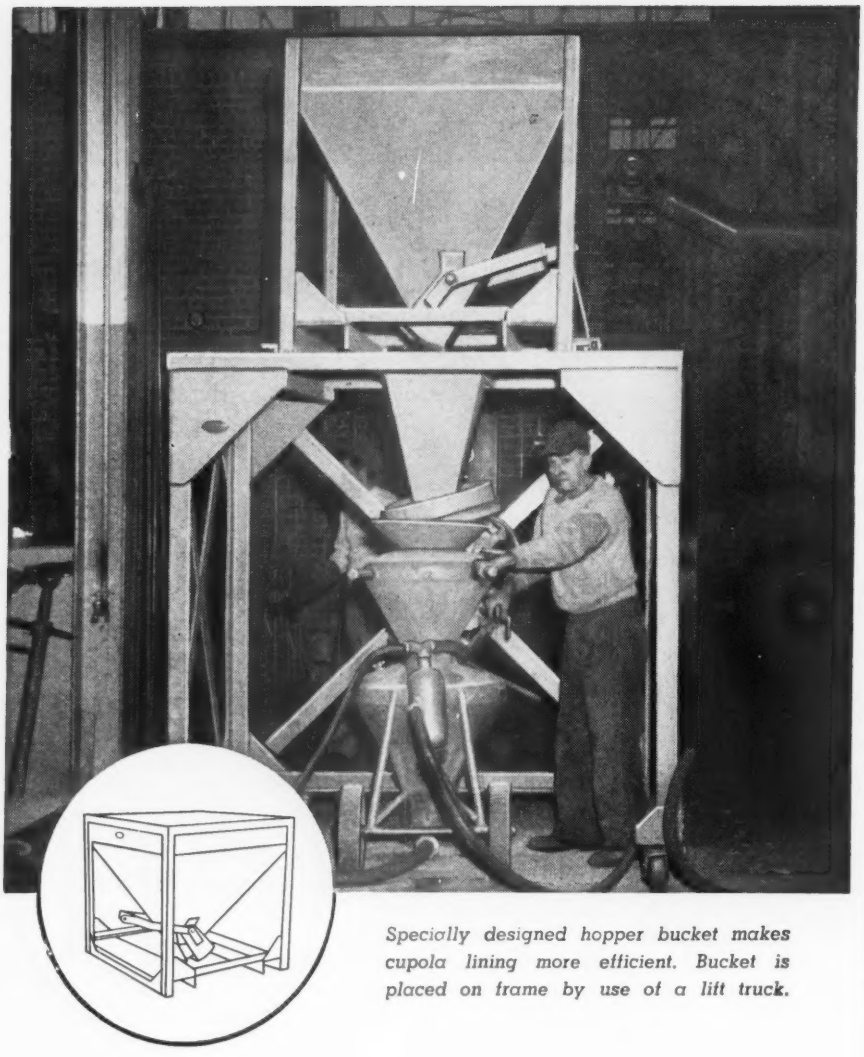
Hanna HP cylinders are without equal for strength, precision and power. For operating pressures up to 1500 p.s.i. Bore sizes range from 1½" to 8" in a complete selection of mounting styles. Heads are fastened directly to the cylinder tube, giving clean appearance.

**WRITE FOR CATALOG 233B**

# Hanna Engineering Works

**1772 Elston Avenue • • Chicago 22, Illinois**

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS



*Specially designed hopper bucket makes cupola lining more efficient. Bucket is placed on frame by use of a lift truck.*

# *Solve Your Material Handling Problems With* PENN IRON SPECIAL EQUIPMENT

In lining cupolas, Textile Machine Works foundry in Reading, Pennsylvania, had difficulty handling the clay mix used with their Bondactor equipment. After a study of the problem, Penn Iron Works, Inc., designed, engineered and manufactured this special hopper bucket for maximum handling efficiency.

Whatever the bulk-material handling problem in your plant, Penn Iron Works, Inc., will be glad to help with its solution. Our wide experience in designing and manufacturing all types of buckets and special handling equipment for foundries can help you cut costs . . . save time . . . increase efficiency.

*For Further Information Write:*

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**PENN IRON WORKS, INC.**

READING, PENNSYLVANIA

of 110,000 psi and a yield strength of 81,000 psi. No difficulty has been encountered by us in exceeding these values.

Castings also must be radiographically sound, a requirement that presents difficulties overcome only by the strictest adherence to experimentally proved casting techniques.

Although production on items such as the prosthesis will never be very high, we feel that the foundry industry can be justly proud of its contribution to the advancement of medical science and human welfare. By supplying high-quality castings that maintain the integrity of both the medical and founding professions, at an economy impossible by any other means, the industry continues to strive for a better world for all.

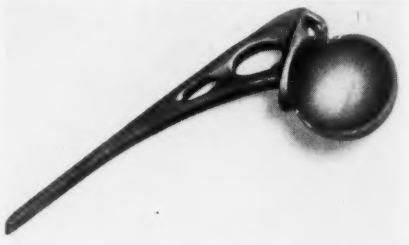


Fig. 6—Prostheses castings are supplied with hollowed heads, as illustrated by sectioned casting

## British Committee Reports on Conditions in Iron Foundries

The first report of the Joint Standing Committee for Conditions in Iron Foundries (in Britain) calls for wider distribution and implementation of the results of research work into prevention of industrial diseases in foundries. The committee also calls for a reduction in foundry accidents by a concentrated attack on the main causes—handling of articles and the movement of molten metal.

The committee was set up as the result of a recommendation of the Joint Advisory Committee on Conditions in Iron Foundries in its 1947 report, and the present publication is a progress report on its work over the last seven years.

The report summarizes conclusions reached in *Industrial Lung Diseases of Iron and Steel Foundry Workers* (A. I. G. McLaughlin and others) and outlines activities of employers, trade unions and the government. Sections are devoted to the cause and control of dust and of accidents. Copies are available at 4s. 6d. each from Her Majesty's Stationery Office, London, England.

# YELLOWSTONE

WESTERN BENTONITE

## THE SUPERIOR SAND BONDING AGENT

Molding sands containing Yellowstone Western Foundry Bentonite have been proved in test after test to have greater green strength and higher permeability. Only a small amount of Yellowstone is required because of its great strength. The superior bonding characteristics permit the use of smaller amounts of bond and less water to temper. For better casting finish and less casting defects Yellowstone is your answer.

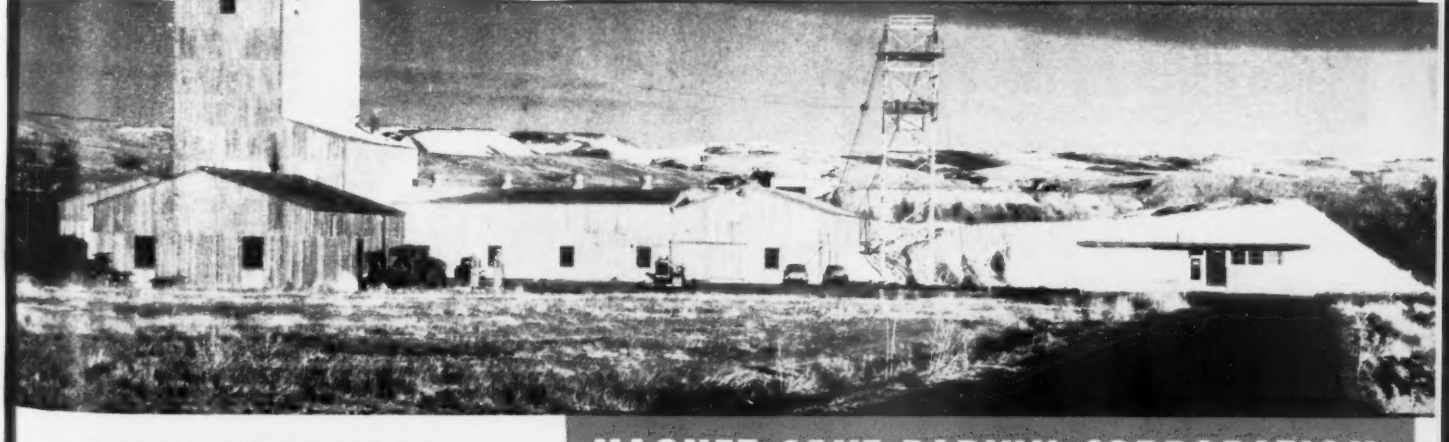
This superior performance is a result of Yellowstone bentonite being selected from the finest deposits of colloidal bentonite at the Yellowstone mines at Greybull, Wyoming. A stockpile containing in excess of 200,000 tons and special processing equipment in the world's most modern bentonite plant guarantee uniform quality in every bag of Yellowstone.

Ask your distributor for Yellowstone Western Foundry Bentonite.

Comparative tests by an independent research laboratory* prove Yellowstone's superiority. Tests were made with an added clay content of 5%.

| | GREEN PROPERTIES (a) | | | | | | DRY PROPERTIES (b) | |
|---|---|---|---|---|---|---|---|---|
| | pH | Green Compressive Strength psi | Permeability AFS Units | Toughness psi (c) | Deformation in./in. | Hardness (d) AFS Units | Compressive Strength psi | Permeability AFS Units |
| Yellowstone | 9.4 | 18.1 | 107 | 145 | 0.008 | 93 | 60.5 | 115 |
| Western Bentonite A | 8.9 | 12.5 | 92 | 140 | 0.011 | 86 | 64.3 | 108 |
| Western Bentonite B | 9.3 | 15.5 | 86 | 134 | 0.009 | 85 | 76.4 | 102 |
| Western Bentonite C | 9.7 | 12.9 | 95 | 136 | 0.011 | 88 | 29.0 | 108 |

(a) Standard AFS Procedures.
(b) Oven dried 2 hours at 220F to 230F.
(c) Product of green compressive strength (psi) and deformation (inches per inch).
(d) Hardness measured on bottom of rammed specimen.
*Name on request.



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# Industry Briefs

**DOEHLER-JARVIS DIVISION, National Lead Co.,** New York, is expanding its die casting facilities by 20 million lb of aluminum and 15 million lb of zinc per year. The expansion will involve the extension of present buildings, addition of new die casting machines and provision of related electrical and hydraulic facilities. It will take place at plants in Toledo, O.; Pottstown, Pa.; Grand Rapids, Mich.; and at Barber Die Casting Ltd., Hamilton, Ont., Canada, a subsidiary of National Lead. Completion is scheduled for the middle of this year.

**Eberhard Mfg. Co.,** Cleveland, suffered $500,000 damage by fire which swept its annealing department Apr. 5. A producer of malleable iron castings, Eberhard is a division of Eastern Malleable Iron Co., Naugatuck, Conn.

**Rheem Mfg. Co.,** Chicago, and Richmond Radiator Co., Richmond, Va., have merged. John J. Hall, former president of Richmond, will become a vice president of Rheem in charge of a separate Richmond division. Richmond makes vitreous and cast iron bath and kitchen fixtures as well as heating and cooling equipment and has four plants on the East Coast. Rheem produces equipment ranging from automatic storage water heaters to military components and equipment. It operates 16 plants in the United States and 17 abroad.

**Urick Foundry Co.,** Erie, Pa., has been issued a trademark on the name Urite to identify a series of cast irons with tensile strengths up to 60,000 psi. They are produced under controls that regulate graphite size and distribution and thereby reflect certain qualities with regard to density, uniformity and machinability.

**Brown & Matthews Inc.,** New York engineers-constructors, have designed and now are building a 130,000-sq-ft plant for the Bonded Products Division of Carborundum Co. at Logan, O. The plant, topped by a 65-ft, 30,000-sq-ft tower for the storage of resinoid materials, will produce standard and special abrasive wheels.

**Aluminum Industries Inc.,** Cincinnati, has sold control to a group of Cincinnatians headed by Harrison O. Ash, president, and Thomas E. Wood and James R. Williams, directors. They have acquired all stock in Aluminum Industries held by Champion Industries. Management of the company is not affected by the transaction, and its recent expansion program will be accelerated. All operations in Cincinnati have been consolidated at the firm's Werk Road division.

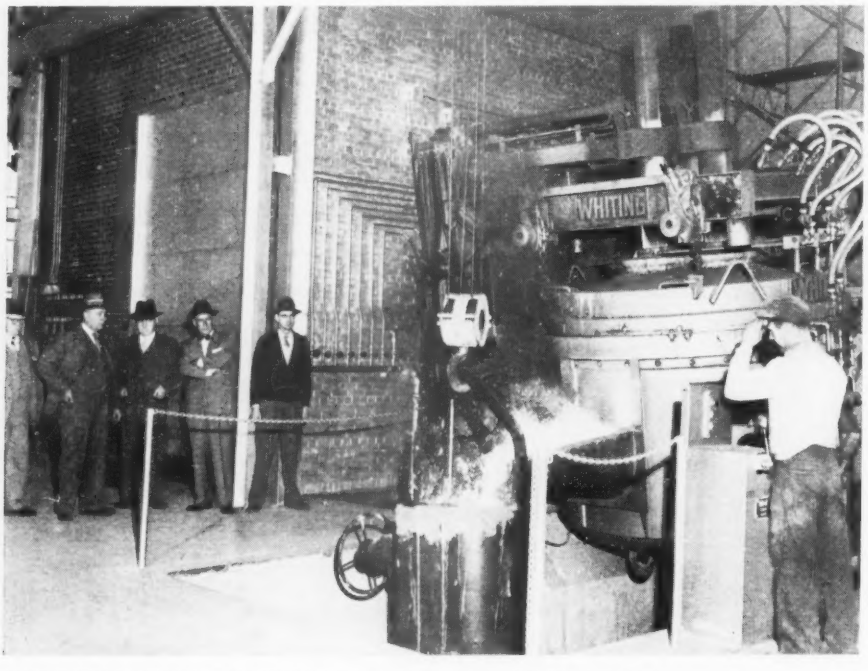
**Northwestern Stove Repair Co.,** a division of Greenlee Foundries Inc., Chicago, has gone out of business. The company's property on Roosevelt Road, Chicago, is being taken over by the city as part of the right-of-way for a superhighway. Decreasing demand for repair parts for coal-fired heating and cooking equipment is said not to justify moving the organization. Other divisions of Greenlee are not affected.

**Ohio Electric Mfg. Co.,** Cleveland, has acquired Kingston-Conley Inc., North Plainfield, N. J., manufacturer of electric motors and other electrical apparatus. Kingston-Conley will be operated as a wholly owned subsidiary of Ohio Electric, and present personnel and staff will be retained.

**Louthan Mfg. Co.,** East Liverpool, O., subsidiary of Ferro Corp., Cleveland, and manufacturer of strainer and breaker cores for the foundry industry, is installing a 40-ft-diam circular kiln and additional storage facilities.

**Lester-Phoenix Inc.,** Cleveland, has announced that Joseph J. Schmidt, representative in the Chicago area, has moved his office to 5875 North Lincoln Ave., Chicago.

**Whiting Corp. (Canada) Ltd.,** Toronto, has acquired Volta Mfg. Co. Ltd., Welland, Ont., which will continue to manufacture electric furnaces, smelters, etc., and handle manufacturing of Whiting foundry equipment. J. A. Handley, president, Whit-




PANGBORN EXPANDS FOUNDRY: This 3-ton Whiting electric arc furnace has gone into operation at the foundry of Pangborn Corp., Hagerstown, Md. With the furnace and one-third expansion in floor area of the foundry, production of cast metal parts for the company's blast-cleaning and dust-control equipment has been increased 300 per cent. Watching pouring of the first heat are, left to right: P. J. Potter, vice president; Frank Kaiss, general superintendent; Thomas Pangborn, president; L. L. Stouffer, vice president; and E. L. Hartman, foundry superintendent. The furnace will produce six heats daily

# NEW ...improved resin for coating sand

# DUREZ 18250

*produces stronger shell molds and cores*

**EASIER...FASTER...MORE ECONOMICALLY**

**AT THE FOUNDRY SHOW**
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**MAY 3rd to 9th**
**Booth 218**
will be headquarters for information on "18250"
Bring on your questions!

**If, like many leaders** in the industry, you have been looking for a resin that will provide higher efficiency in producing shell molds or cores with cold coated sand—*either dumped or blown*—Durez 18250 is the answer.

This newest development in the Durez line of foundry resins, used with the Durez cold coating process—blended alcohol and water as the solvent—turns out precision castings with outstanding economy.

**Mulling time is less** and no caking or packing is normally encountered. Unusually fast cure of the resin results in shorter cycles. Cold strength of shells and cores is up to 30% greater, and hot strength is also superior. Castings exhibit pattern-like surfaces and clean, sharp edges that reduce or eliminate finishing costs.

**Coated sand made by the Durez** process with 18250 resin provides the following advantages:

- Greater strength, permitting more economical sand-to-resin ratios—
- Thinner molds are practical—
- More uniform structure—
- Freedom from dust and segregation—
- Minimum lubrication of patterns.

Send for data and order a trial shipment of this new resin.

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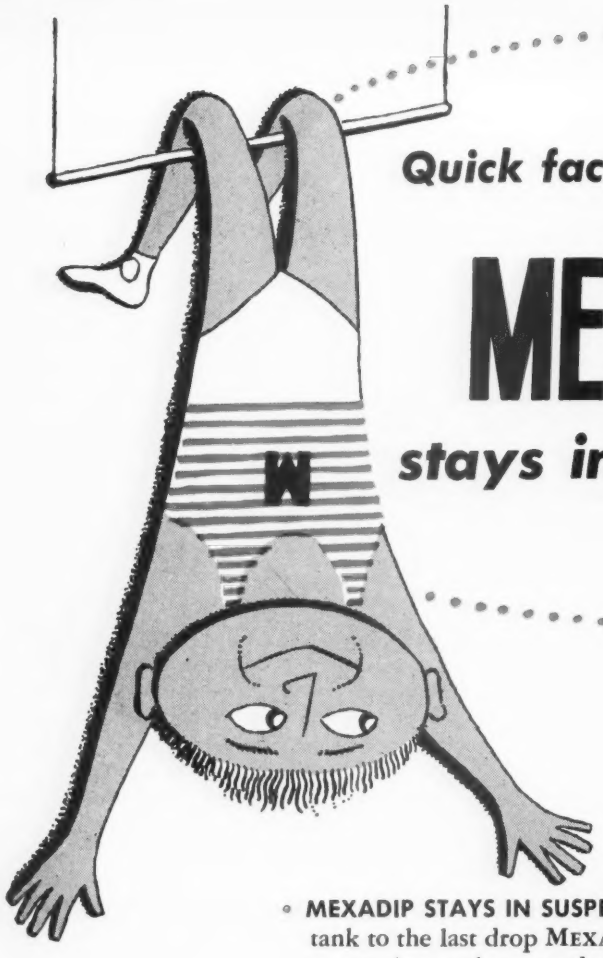
*Export Agent:* Omni Products Corp., 460 Fourth Avenue, New York 16, New York



*For more information, use Reader Service Card, page 347*



*Quick facts for foundrymen . . .*

# MEXADIP®

## *stays in suspension!*

- **MEXADIP STAYS IN SUSPENSION.** From full tank to the last drop MEXADIP stays in suspension at the same desired Baume. Let it stand over the week end, it will be ready to go Monday morning.
- **MEXADIP WILL NOT RUN, BUILD UP OR RUB OFF.** It applies equally well on either green or baked cores.
- **MEXADIP WILL NOT FERMENT.** You will not have to dump your wash because of hot humid conditions—no pock marks or pitted coating surfaces with MEXADIP.
- **MEXADIP IS DEPENDABLE AT ANY BAUME.** It is applied daily to cores for thousands of tons of castings over a range of 10-40 degrees Baume.
- **MEXADIP REQUIRES NO LONG "PASTE" MIXING.** No waiting period is necessary. Just add the powder to water and after a few minutes of stirring it is ready to go.

**IMPROVE CASTING APPEARANCE AND SAVE MAN HOURS IN THE CLEANING ROOM.** If you have a problem with core wash, MEXADIP will solve it. Ask us to arrange a test today.

Write for free illustrated Engineering Bulletin No. 17 giving detailed information about the complete line of Core and Mold Washes, made by The United States Graphite Company.

# MEXADIP®

213

# THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

ing Corp., Harvey, Ill., is president of the new company, and Roy Garnett is vice president-general manager. Fred Tighe has succeeded Mr. Garnett as sales manager of Whiting (Canada). W. K. Leach, former president of Volta, continues with the company as a director.

**Electro Metallurgical Co.,** a division of Union Carbide & Carbon Corp., New York, has established a Product & Process Development Department with extensive facilities at Niagara Falls, N. Y. It will concentrate on developing better and more economical technological processes, and it will develop new products and applications for those products. E. F. Doom, formerly director of the company's metallurgical department, will head the new department.

**Ferro Cast Corp.** on Apr. 15 completed moving into new quarters at 2202 Broadway, Santa Monica, Calif. The plant consists of 15,000 sq ft of floor space in a modern brick building and more than doubles the manufacturing space the company has utilized during the last five years. Ferro Cast produces ferrous and nonferrous precision investment castings by the lost wax process.

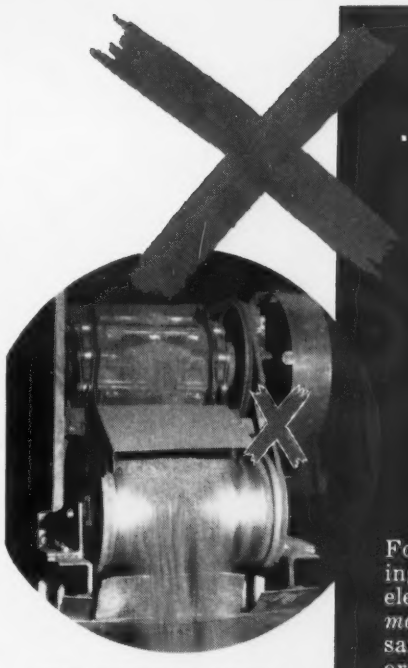
**Laclede-Christy Co.** Division, H. K. Porter Co., St. Louis, has appointed J. D. Wilson Co., Milwaukee, as distributor of its refractories in the Chicago metropolitan district. C. J. Simmons has been named warehouse manager at 4452 West Fifth Ave., Chicago. T. H. Ferber and A. M. Lieser will continue to service accounts for the Wilson company.

**Basic Inc.** is the new name of the former Basic Refractories Inc., Cleveland. The new name reflects the company's expansion and diversification. Stockholders also have approved an increase in the number of authorized common shares from 650,000 to 1¼ million.

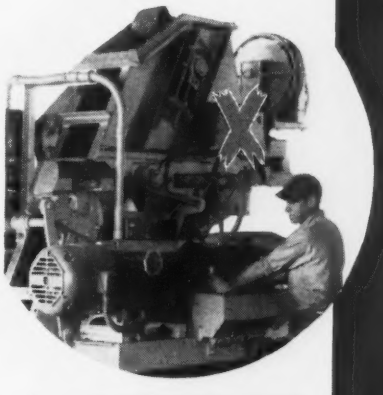
**General Electric Co.'s X-Ray Dept.,** Milwaukee, has created two separate marketing sections to replace its former single section. One will handle industrial applications and the other medical uses.

**Manor Die Cast Corp.,** 7500 Bessemer Ave., Cleveland, is building a 15,000-sq-ft shop on Northfield Rd., in Walton Hills, scheduled for occupancy in May.

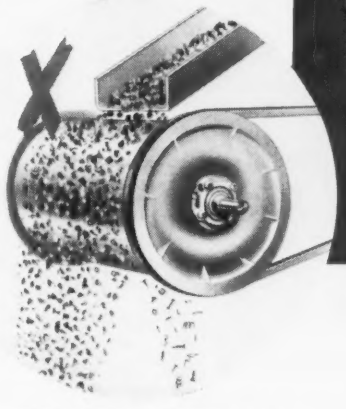
**A & M Castings Inc.,** 10111 Burtis St., South Gate, Calif., will build a one-story, 1174-sq-ft, concrete-block office building at the same address.

**WITH APRON CONVEYORS,** or in any installation where pulley-type separators are less practical, a Dings Perma-Drum is the simplest solution to magnetic separation problems.



**IN SAND PREPARATION EQUIPMENT,** Dings Perma-Drums give positive protection against tramp iron damage while assuring the *complete* magnetic separation necessary for *complete* sand preparation.



**UNDER CHUTES, SPOUTS** or bins, a Dings Perma-Drum is the most efficient, low cost method of magnetic separation.

...MARKS THE SPOT IN YOUR SAND HANDLING SYSTEM WHERE A

# DINGS PERMA-DRUM SAVES MONEY

For many applications, there is nothing to compare with a Dings non-electric Perma-Drum for *fully automatic*, low cost removal of iron from sand. Use them below apron conveyors where magnetic pulleys may not be practical. Install them below chutes or spouts where no other type of magnetic separator will fill the bill. Apply them for final removal of shot iron and small fragments that may get by the first separation of shake-out sand.

*Check these Perma-Drum features*

- **Completely automatic operation — separates and discharges the iron.**
- **Life-time magnetic power — permanence guaranteed.**
- **Non-electric, Alnico design — no electro-magnet maintenance.**
- **Maximum magnetic power — the most powerful drum-type separator available.**
- **Magnetics are cleanly discharged from the drum shell, minimizing wear and providing years of maintenance-free operation.**

The Dings Magnetic Perma-Drum is one of a complete line of magnetic separation units engineered by Dings to meet every foundry requirement. Write for information about Dings electric and non-electric magnetic pulleys; rectangular suspended magnets (standard or self-cleaning); lifting magnets; non electric Perma-Plate magnets.

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**WRITE FOR CATALOG C-1100-A**

**DINGS MAGNETIC SEPARATOR CO.**
**4708 W. Electric Ave.**
**Milwaukee 46, Wis.**

PD156-2/3

# Man to Man

By RALPH L. LEE

*"Making money is one good reason for being in business, but it isn't the only one. It wouldn't hurt a bit, once in a while, to back out of the woods and look for our reasons"*

THE contrast between two shops I visited this past week has left me wondering whether the honest-to-goodness reasons for being in business don't have one whale of a lot to do with prospects for success or failure.

I don't believe I ever saw such a wide variety of products being made under one roof as in the first shop I visited. Diversification had been carried to the ultimate point. Food-handling cabinets, garage door openers, electrical generating units for pleasure boats, subcontracted parts for guided missiles, stator winders for small motors and custom model-making for experimenters included some of the products the owner of the business showed me.

Out of the corner of my eye I also saw abandoned fixtures and equipment and partly finished products and raw material in almost as great a variety as the active items. The small number of employees rattling around among so much idle equipment in much too much room didn't paint a healthy picture from a business standpoint, although I saw more evidence of inventive doodling per square foot than I've seen for a long, long time. The boys told me quite frankly they were trying to get back on their feet after having been closed down for quite a spell.

My very first peep into the other shop I visited left no doubt as to what they were up to. They were making coreblowers — nothing else. The place was *neatly* crowded with coreblowers in all stages of completion and with a very few finished machines standing around. All the employees were hard at work on the job. Every piece of equipment, and a surprisingly small number of pieces for the work they were turning out, was turning over, making parts for coreblowers.

The boss who took me through the plant talked nothing but coreblowers, how they were made and why. If through my gabby efforts conversation began to stray from the straight and narrow, the boss soon finagled it back on the beam. I didn't have to be told that these folks were doing mighty, mighty well for themselves.

Quite some time back I heard quite an impassioned speech by one of our top-notch foundry leaders to the effect that it was just about time for us to quit kidding ourselves, pussyfooting around, and to come out like men to face the fact that there was one reason and only one for being in the foundry business — *to make money.* I found myself nodding my head all the way through his talk, recalling many cases of foundries which had lost their shirts by selling castings for less than they cost or by not even knowing the costs.

But when this distinguished speaker got through and the spell his eloquence had cast over me began to simmer down a bit, I couldn't get rid of this thought: "Yes, moneymaking has to be one of the good reasons for making castings but not the only one, by a long shot." In fact, I said to myself (I talk to myself quite a bit here lately; it's age I think), "From what I have seen of the mortuary statistics about businesses, one of the surest ways of guaranteeing the early death of a foundry or any other business is to have making money as the only reason for being in it. There's got to be some other reason, and a darned good one at that."

I found that there was no mystery behind the conception, birth and healthy growth of the coreblower business I visited. With a background of years of practical foundry and patternmaking experience, the founders of this business went at and licked a coremaking problem in the plant where they worked. They licked the problem with a little bench coreblower of their own invention. Others saw it and wanted it—so many, in fact, that they had to quit their jobs and start a business of their own.

There isn't the slightest doubt in my mind that the original reason for starting the first business I visited last week has long since been lost in the shuffle of time and circumstance. I am sure that we all know of foundries where the reasons for being have been lost in the shuffle.

I've been in some which poured gray iron into molds for castings ranging in size from a few ounces to a ton or two, in erratic lots with brass, bronze and aluminum on the side—folks who just couldn't say no. Either that or they had an obsession for proving their foundry genius by doing anything they set their minds to.

On the other hand, I have been in other foundries, any number of them, which know exactly why they are in business, the particular kind of business they are in, where it begins and where it ends. The boss of one of these not so long ago was telling me, "Doc, being afraid to say 'No' just about wrecked us a while back. Ever since we started, we've made our bread and butter in 12 x 16-in. flasks. (I think that's the size he said.) Well, along would come one of our best customers with a great big floor job, and like weak-kneed yes-men, we'd take it on and throw the whole place out of gear. For a while, we had the whole place cluttered up with these out-of-range public relations and good-will jobs, losing money on all of them.

"Now, we stick to our last. We have limited ourselves to the kind of work we know we have the edge on. We are specialists. If a good customer comes to us for something out of our line, we'll get a foundry for him which specializes in that particular type of work. We haven't lost any customers yet, as far as I know. On the contrary, we've built good will among our fellow foundrymen."

I don't think there can be any doubt that most of our outstandingly successful foundries have clean-cut reasons for being in business. They have made a career of some particular type of work they have earned a reputation on. It may be finish, metallurgy, speedy service, intricate core work, great big work, little tiny work, long runs of tremendous quantities

# Pangborn Rotoblast® cuts labor costs 33% at Commercial Steel Castings!

The Pangborn Rotoblast Room at Commercial Steel Castings Co., Marion, Ohio, has speeded production to the point where three round-the-clock shifts have been cut to two—a savings of 33% in labor costs alone!

You save on labor costs *two* ways when you blast clean with Pangborn Rotoblast. For one thing, Rotoblast's faster cleaning gives you more production per man-hour. This eliminates overtime, cuts down your work force . . . often permitting the reduction of two or even three shifts to just one.

In addition, the automatic operation of Pangborn Rotoblast frees your working men for other tasks during the actual blasting process. Lower labor costs, faster production, less maintenance, high-quality cleaning—these benefits mean *lower cost per ton of castings cleaned,* and make it well worth your while to investigate Pangborn Rotoblast for any blast cleaning problem. For complete details, write for Bulletin 227 to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

**Visit "Pangborn Institute" at AFS SHOW, ATLANTIC CITY, May 3 to 9**

## And saves McCallum Bronze $3,400 a year in manpower!

The Pangborn Rotoblast Blastmaster® Barrel at McCallum Bronze Co., Buffalo, N.Y., has *cut cleaning time* 80%. The resultant reduction in man-hours saves the firm $3,400 a year!

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Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

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TUBES • REGENERATOR • ALBRAL • PLUMBRAL • COVERAL • DEGASER
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Wherever metals are melted and cast, in foundries and refineries all over the world, FOSECO products are available to help produce the finest castings possible.

There is a FOSECO product for every casting need and for every type of metal. A complete range of ***covering, protecting and refining fluxes, deoxidants, degassers, grain refiners, moldable exothermic compounds, riser covering compounds, mold, core and die dressings,*** and many others . . . over 150 in all . . . make up the world renowned FOSECO family of casting products.

There are complete manufacturing plants in Canada, England, France, Germany, Italy, Austria, and South Africa as well as in the United States. FOSECO technical representatives are located in forty countries, in every section of the world. FOSECO is a far-reaching, solidly established organization which has been going about the business of improving castings and foundry practices for over a quarter century. This wealth of experience and knowledge, gained through research, development and activity in the foundry field means FOSECO products and service can solve all your casting problems.

Our plant, at Columbus, Ohio, has a highly trained group of technical representatives serving the entire nation. They are always available to help you with your casting and melting problems. The Canadian plant is located in Guelph, Ontario.

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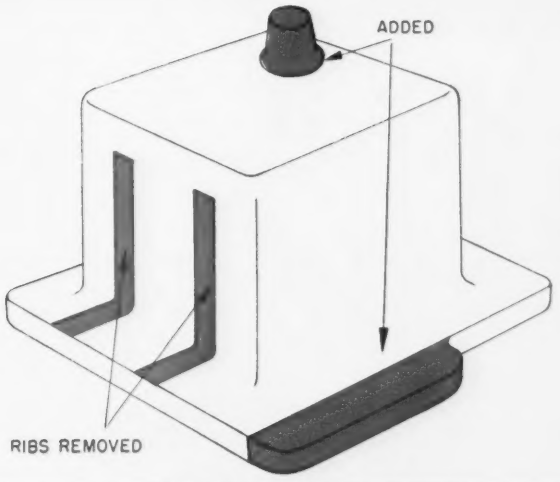
## HOW TO DO IT

# Color Aids in Identifying Loose Pieces Used in Altering Patterns

By A. H. SQUIRE
Sutton Coldfield
Warwickshire, England

REQUESTS for production of special castings from slightly altered standard patterns are encountered in many foundries. Temporary pattern changes often are made by adding or removing loose pieces. Confusion as to which pieces belong on the standard pattern and which are temporary can be avoided if the loose parts are painted green or some other color not usually used on color-coded patterns.

The color aids in identifying the alteration needed to put the job back to standard. This saves time in the pattern shop and is a safeguard against use of the altered pattern for standard jobs.




**Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea**

and low profit margins, short runs in job lots—we haven't even scratched the surface.

It wouldn't hurt a bit, every once in a while, to back out of the woods we've got ourselves into and look around for our *reason* tree. We certainly don't want to be just another foundry, run-of-the-mine, one of the herd. As a result of this research we are likely to end up with a new lease on life, with a clear-cut policy, a business philosophy and something to stand for.

Making money is one good reason for being in business, but it isn't a product; it's a report card for making products people want and will buy. President Curtice of General Motors says, "You had better sell your product for more than it costs, or you'll soon be out of business."

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## Issues Associations Directory

Over 7000 trade, business, professional, scientific, labor, social welfare, etc., organizations are listed in the Encyclopedia of American Associations, published recently by Gale Research Co., 247 Kenworth Rd., Columbus 14, O., at $15 a copy. Alphabetically arranged by key word, the book includes the address of the headquarters, name of executive secretary or principal officer, number of staff members, year founded, number of local groups, and general description outlining membership and purpose of the group. Two additional supplemental sections include subject and functional groupings, and a semi-annual supplement listing new organizations, changes of address and deletions.

FEF COMMITTEE VISITS KENTUCKY: Initial meeting of the Foundry Educational Foundation Industry Advisory Committee at the University of Kentucky was held recently. Dean D. V. Terrell, Prof. C. S. Crouse, head, department of mining and metallurgical engineering, and Prof. E. B. Penrod, head, department of mechanical engineering, guided the committee on a tour of the engineering campus. Dr. H. L. Donovan, president of the university, welcomed foundry executives at a luncheon at the Kentucky Union. At a business meeting which followed, Edward J. Walsh, executive director of the FEF, discussed the history and purposes of the foundation, and Prof. R. E. Swift, department of mining and metallurgical engineering, introduced the first recipients of FEF scholarships at the school. Members of the committee and of the University of Kentucky faculty are shown at the meeting in the illustration above

**Easy to Mix.** Just add water according to instructions. Mixes in about five minutes.

**Consistency of Mix** is as workable as any cement mix.

**Pours Readily** into any prefabricated form.

# New ALUNDUM* 33-I insulating castable...mixes and pours like concrete...protects to 3300°F.

## *A New Norton Refractory Rx*

Now you can protect critical areas in your furnaces and other high temperature equipment to 3300°F with ALUNDUM 33-I insulating castable — a new, easy-to-install NORTON Refractory Product.

33-I comes in dry form in moisture-protective bags.

33-I — You just add water according to instructions. Mixes readily.

33-I pours into any prefabricated form like a concrete mix.

*And . . .*

33-I insulates up to 3300°F.

33-I is light in weight and monolithic in structure.

33-I saves down time for repairs.

*Characteristics of ALUNDUM 33-I*

| | |
|---|---|
| Density | 100 lbs. per cu. ft. |
| Setting up time | |
| Stiffens | 1 hr. |
| Initial set | 4 hrs. |
| Final set | 18-24 hrs. |
| Chemical Analysis — $Al_2O_3$ | Primarily |
| $SiO_2$ | < 0.1% |
| $Fe_2O_3$ | < 0.1% |
| Maximum hot face temperature | 3300°F |
| Water added per 100 lbs. | Approx. 4¼ gals. |
| Grain Size | 6F |

This newest Norton refractory Rx is *engineered and prescribed* for maximum protection and quick, easy installation in a wide range of uses. For further facts on ALUNDUM 33-I insulating castable, write to NORTON COMPANY, Refractories Division, 304 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

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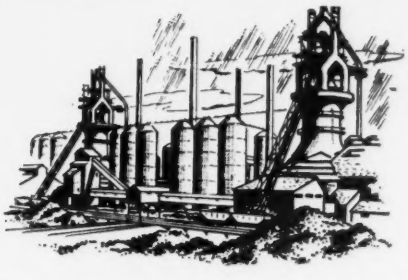
*Typical Applications in Metal Processing*



Linings for atmosphere furnaces. Insulation for pit furnace linings.

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# Cut Foundry Air Line Costs

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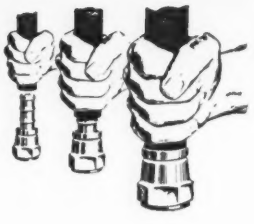
(Patent applied for)

FITTINGS AND HOSE



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Aeroquip Hose Lines withstand vibration, flexing and abrasion. Next time you need air hose, order Aeroquip *SOCKETLESS* Fittings and Hose. Your Yellow Page Directory lists the Aeroquip Distributor near you, or write us for Bulletin 154.

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# Damage Liability — What You Should Know About It

## *Court Decisions Indicate Where Liability Belongs*

By Albert W. Gray

IN RED ink across the face of an order of a New York city iron works, these words were printed: "Read carefully conditions on back of this order." This legend was supplemented in black block letters: "Furnish and deliver materials below subject to conditions on the back of this order."

On the back of the order was endorsed, "In consideration of this order vendor agrees to save us harmless from all claims for personal injuries on the part of himself or his employees while on our premises in carrying out the work called for herein whether or not such injuries are attributable to our negligence."

Through the negligence of the purchaser a workman was injured. In holding the seller responsible for the payment of the damages recovered by this employee, the New York Court said, "It is a general principle of law that a person may by agreement exempt himself from his own negligence, the only requirement is that the language of the agreement must be clear and unequivocal. The agreement herein specifically provided that the seller would hold this purchaser harmless from all claims for personal injuries on its part or its employees while on the premises in carrying out the work called for, whether or not such injuries were attributable to the negligence of the purchaser. This is plain, clear and unambiguous language and must be given a plain meaning."

In California only a few months ago there came before an appellate court in that state an agreement of this character. On the invoice in this instance was printed, "Under no circumstances are we responsible for any damages beyond the price of the goods. No damages or charges of any kind, either for labor, expense or otherwise, suffered or incurred by the customer in repairing or replacing defective goods or occasioned by them, shall be allowed."

For damages incurred through defects in the goods manufactured by this company, a purchaser had sued. Although the court recognized and followed the law laid down by the New York Court, it limited its application in this instance to a strict interpretation of this stipulation, and

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held that by its terms it did not relieve this seller from liability for negligence.

"The language," said the court of the stipulation in this instance, "falls far short of manifesting that it was the intent of the parties that the seller was to be relieved of the consequences of its own negligence. In cases where the public interest or some statutory prohibition are not involved, it is permissible for a party to a contract to absolve himself from liability for future negligence. Nevertheless the law does not look with favor upon attempts to avoid liability or secure exemption for one's own negligence and such provisions are strictly construed against the person relying upon them.

"The provisions of a contract relieving one of the parties thereto from liability for his or its own negligence should be clear and explicit. These provisions are pertinent to our inquiry as to whether the language in question is broad enough to exempt this seller from all manner of negligence on its part in connection with the manufacture and sale of this equipment. Examined in their entire context it is patent from an analytical reading of the documents in question that they go no further than to limit the seller's liability for breach of warranty."

In a case before the United States Supreme Court, a railroad had stipulated with the contractor in a grading contract that "The company shall assume no obligation or risk in case of accident or damage to men and supplies." In an action for damages arising from the performance of this contractor's work, it was contended by the contractor that such an exemption could not be allowed a common carrier or a company engaged in public service.

The court stated, "It is an established doctrine of this court that common carriers cannot secure immunity from liability for their negligence by any sort of stipulation. Manifestly this rule has no application when a railroad company is acting outside the performance of its duty as a common carrier."

Of the application of the law to occasions not involving the activities of a common carrier or other public servant, the court continued, "There is no rule of public policy which denies effect to their expressed intention but on the contrary, as the matter lies within the range of permissible agreements, the highest public policy is found in the enforcement of the contract which was actually made. Undoubtedly it is not to be lightly concluded that the railway company has been relieved from liability for its neglect but on the other hand, if this was the agreement fairly interpreted, it is not to be arbitrarily overridden. The risk of loss or damage to the grading outfit or supplies from any cause while being transported over the land of the railway company could be assumed by one party or the other, as they saw fit."


**References**

1. Paddle v. Atlantic Basin Iron Works, 91 N.Y.S.2d 336, New York
2. Basin Oil Co. of Cal. v. Baash-Ross Tool Co., 271 Pac. 2d 122, California
3. Santa Fe Railway v. Grant Bros., 228 U.S. 177


## Book Explains Profit Sharing

The latest thinking on profit sharing by the top profit sharers in the U. S. and Canada is described in *Profit Sharing—The Key to Industrial Teamwork,* a new 104-page volume available from the Council of Profit Sharing Industries, 337 West Madison, Chicago 6.

Copies of the book are free to members or $3.75 to nonmembers.

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*246 washington rd.*
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Exhibiting at the Foundry Show—Booth 1325

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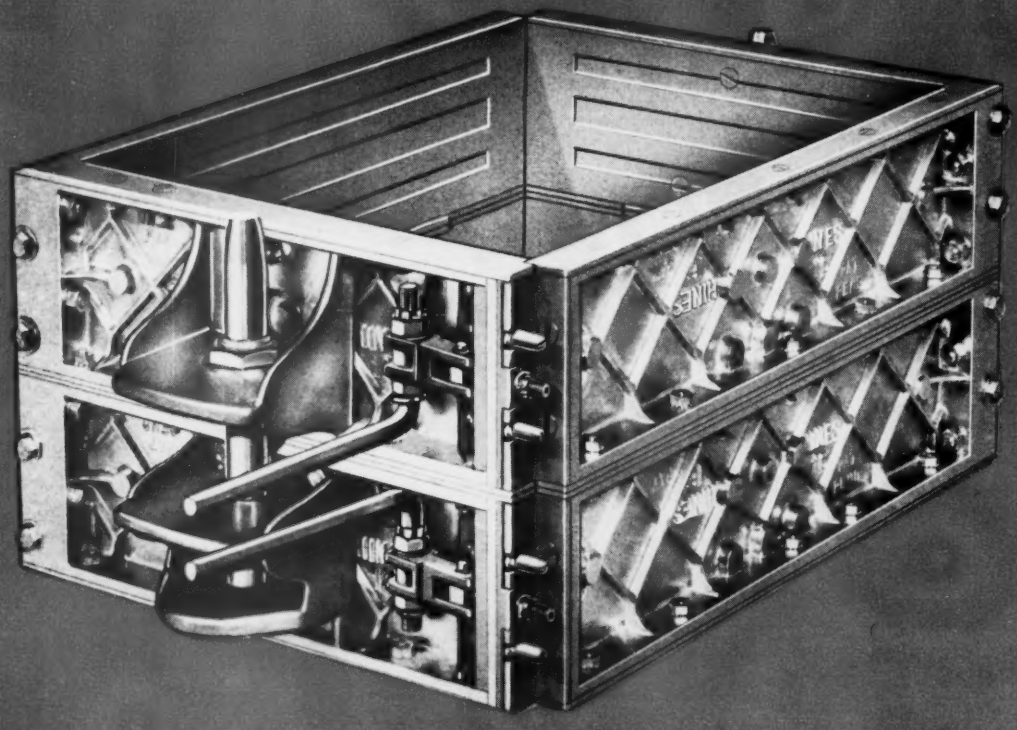
# HINES *announces* ITS NEW

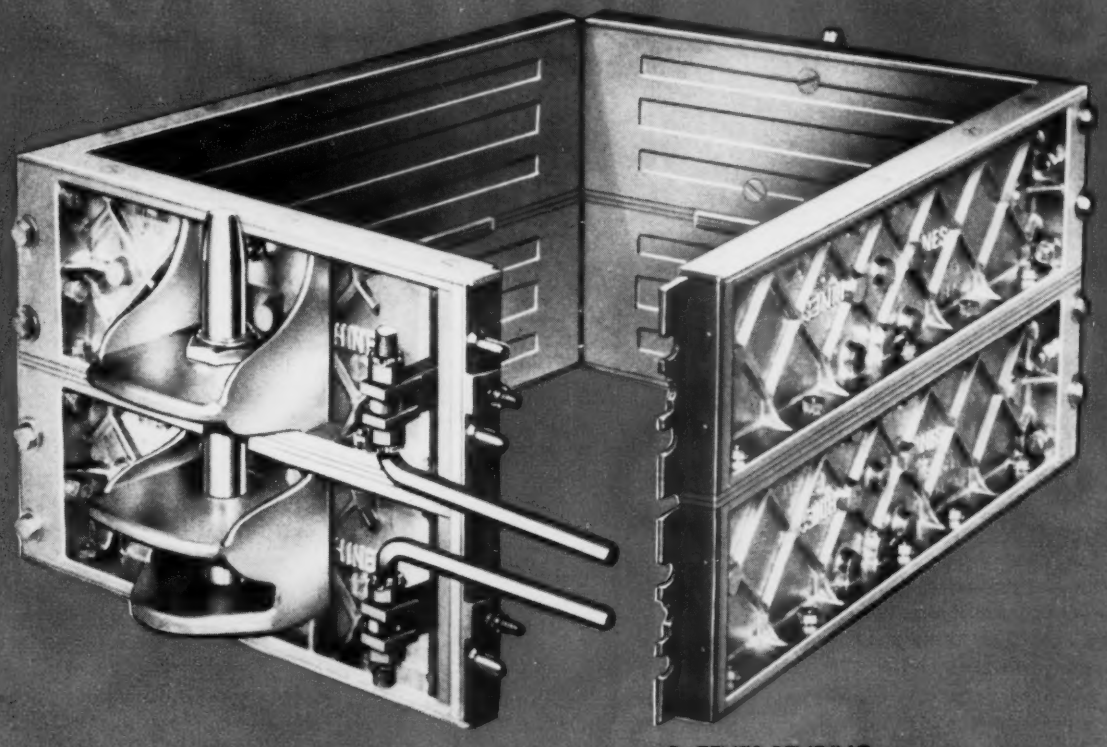


PATENTS PENDING

This new, straight-wall, Hines "HINGE-OFF" flask is recommended for hand and mechanical molding of loose, match plate and cope and drag plate patterns, up to 20″ in length. Made of light weight metal, it maintains alignment because it will not warp from absorbing moisture and drying, as in wood flasks. No wood screws to work loose! Accurate pins and guides and pin center alignment! And, it is provided with a positive, fast-acting, locking mechanism that aligns and locks the open end perfectly and rigidly, to prevent shift!

Maintenance is economical — flask can be repaired and kept in alignment at your own plant. Only one adjustment — tightening the nuts on the locking mechanism. Lengths and widths, 10″ to 20″, in even inches. Cope and drag depths, 3″ to 5½″, in half-inches. Depths over 5½″ are made up in sections. Equipped with Hines standard pins, bushings or guides.

# HINGE-OFF FLASK



PATENTS PENDING

This new "HINGE-OFF" flask is being used in our newly developed STACK OR MULTIPLE MOLDING METHOD (Patents Pending). Contact our Main Office for working arrangements and prices.

See the new, Hines "HINGE-OFF" flask at the A. F. S. Foundry Show in Atlantic City, at Booth No. 1818. Or, write our Main Office for complete information.

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## THE HINES FLASK CO.

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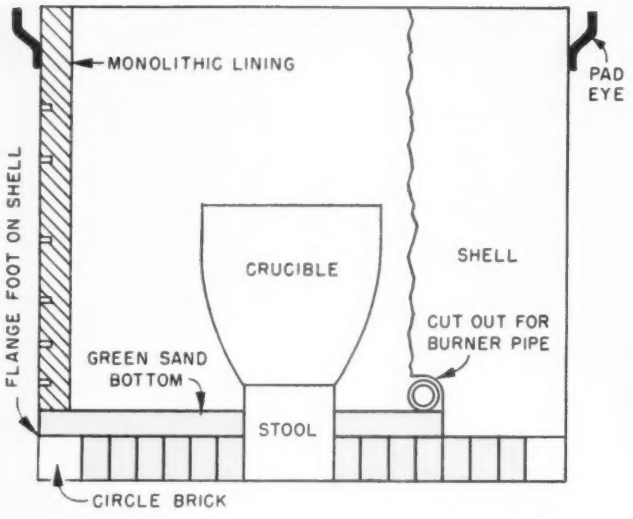
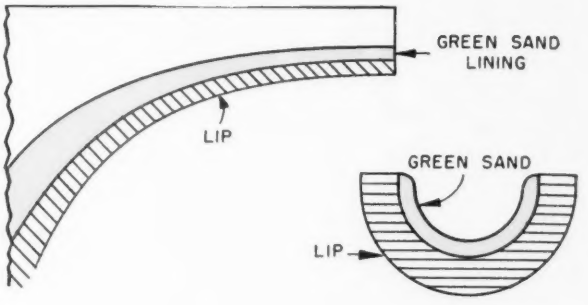
# Trouble Shooting

By C. W. AMMEN




Drawing at left shows pit installation which provides simple method to lift out body and avoids damage to refractory lining when a melt is lost in the bottom. Right drawing illustrates a method of avoiding damage to the lips of crucibles

## Pits for Crucible Furnaces

Dear Charlie:

Well, old boy, here is a pair of troubles I have had for a number of years. They are not killers, but have at times drawn blood. We have three gas-fired furnaces which are in a very close-sided pit and have no slag hole at the bottom. You know the type of which I speak, with the covers even with the floor. It slides back on outrigger wheels attached to the back of the cover.

Every now and then we lose a pot and fill the bottom of the furnace with the melt. When that happens, we have to snatch out the furnace, and usually it requires a new lining. This we find is the case even with a slag hole which requires a lot of picking to keep it open and with a larger pit, a backless pit, removable grates, etc. Ever see a close-sided pit with no exhauster slag hole for which there was a simple system for removing the bottom and saving the lining in case of an accident?

On the tilt-type rigs, we lose too many crucible lips. This seems to result from metal, slag, etc., sticking to the lip and plugging it up. In an effort to chip the lip open, we snap it off. Also, sometimes the lip cracks at the pot or between the pot and the inside wall of the furnace, but only when the pot is full up and ready to pour. So most of the heat goes down the front of the inside of the furnace. Is there any way of saving a heat when this happens?

Sincerely,
Sam

Dear Sam:

Let's take your question in order. First, the pits. There are about as many types of pits and installations as there are liver pills or flax seeds. I also am of the school which uses close, straight-sided pits with no slag hole at all at the bottom. I assume that this crucible breakage of which you speak is just a once-in-a-while deal and that you watch the crucibles closely enough to retire them before it happens. Also, that the tongs, shank, etc., fit correctly and that care is exercised in charging so as not to crack or split anything.

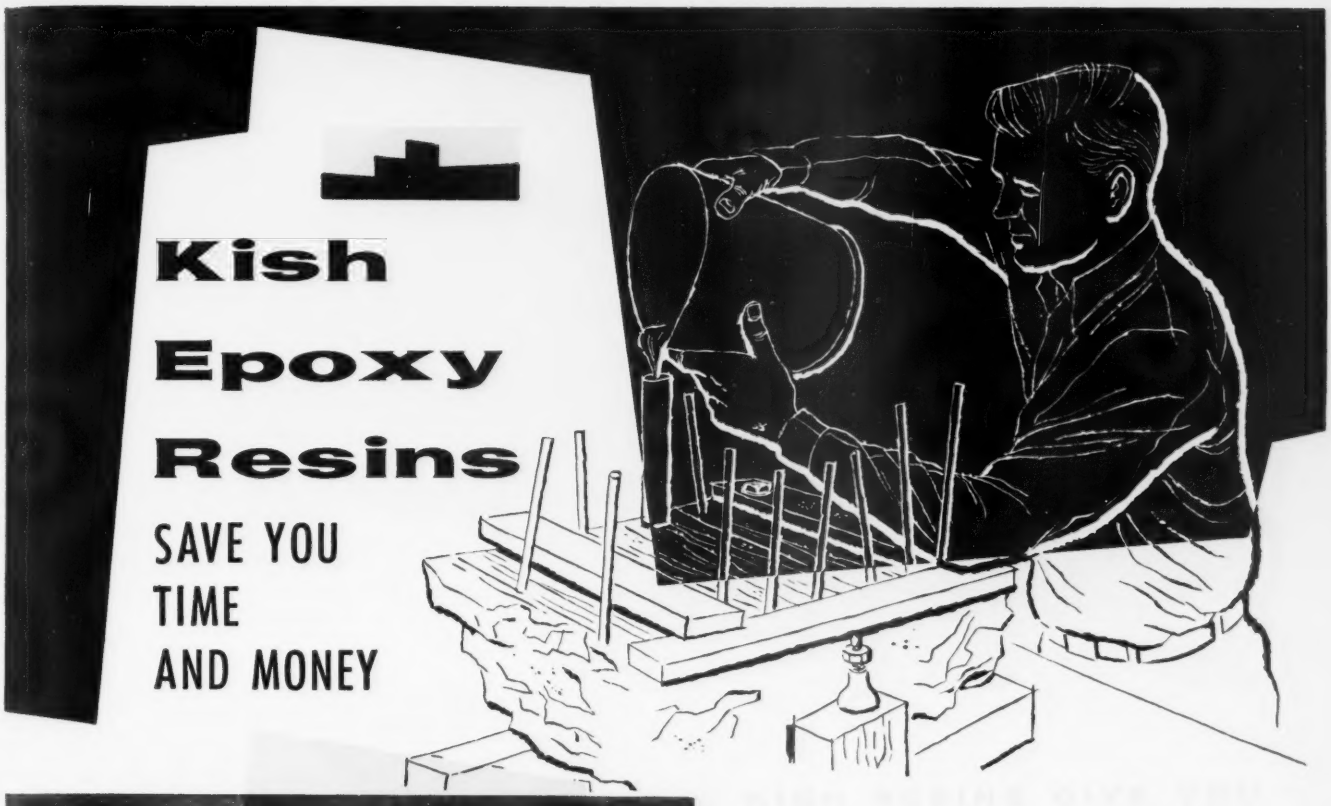
A small bushing foundry out here in the smog is run by a big Swede who seems to have the answer to your first question. His pits are straight-sided and very narrow. The pit rigs are simply steel cylinders lined with a monolithic lining from the top edge to within 8 in. of the bottom. The stool sits in the center of a course of circle brick laid up loose on the floor around the stool. The stool is stuck down with a mixture of clay and water glass. The shell and partial lining has two pad eyes on the topside for lifting and is slotted to slip down over the burner pipe.

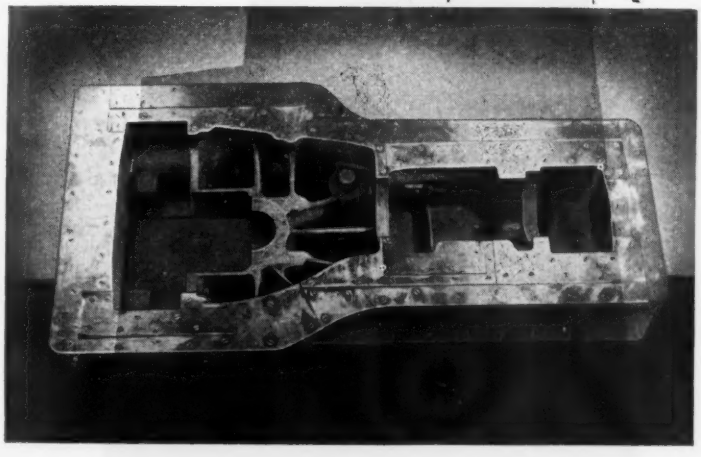
The installation is very simple. The furnace shell is lowered into place over the burner pipe and onto the ring of circle brick around the stool. The resulting space is rammed full of molding sand tempered on the heavy side with clay wash. This practice I am told is used when the pits are run continuously for eight or more hours per day. The body is lifted off each night, cleaned out, set back and a new bottom rammed in place for the next run, as you would with a cupola.

This practice gives him a trouble-free operation. When a pot is lost in the furnace, it is a simple matter to lift the body out, remove the brass and the sand bottom, return the body, ram in a new green sand bottom and fire away, with a minimum of lost and downtime. Also, this repair is accomplished without loss of the lining and does not require expensive refractory repairs to lining and bottom.

When a pit is to be put into intermittent service, in which it is fired only a few times a day, a clay ganister material is used in place of the green sand bottom and partial sides. This is replaced once a week or when needed.

I examined a green sand bottom



The development of Kish Epoxy Resins now gives foundries a fast setting, tough casting resin which provides better wear resistance, easy draws, long life and less core breakage — all with extremely close tolerances. Kish Epoxy Resins can be cast over any type of material and actually eliminate one complete operation. Here's low cost casting, in thicknesses of ⅛ to ⅜ inch, with a dense, smooth surface that does away with extra machining.

Kish Epoxy Resins contain EPON* resins. They are impervious to weather conditions and are dimensionally accurate under normal atmospheric and shop conditions. With Kish Epoxy Resins over 45,000 sand cores were made from one core box — real proof that here's one way to cut foundry costs 40%. Use Kish Epoxy Resins.

*Trademark Shell Chemical Corporation

## HERE'S WHY MAJOR FOUNDRIES HAVE FOUND KISH EPOXY RESINS SUCCESSFUL:

- Pattern surfaces are poured in ONE operation with savings up to 40% over metal equipment.
- Master molds serve as final mold when Kish Epoxy Resins are used. Pouring to original wood molds cut 90% of finishing operations.
- Fast setting Kish Epoxy Resins allow unlimited duplication of core boxes and patterns.
- Better sand release of Kish Epoxy Resins reduces core breakage and expensive hand slicking — no need to disturb molds when drawing patterns.
- Shrinkage in Kish Epoxy Resins is as little as .0001 inch per inch cured. And in epoxy duplicates, no shrinkage allowances are necessary.
- The greater adhesive qualities of Kish Epoxy Resins mean pattern mistakes can be easily corrected by simply adding additional material where needed. Kish resins fuse perfectly to cured patterns without showing a line of demarkation.
- Patterns and core boxes, using Kish Epoxy Resins, can be built in a fraction of the time normally required — result in savings in time and money — more accurate castings and greater production.

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and partial sides after an eight-hour running period and was surprised at the excellent condition it was in. The erosion at the burner entry was very slight and the unit could have been fired, I am sure, for a good many more heats.

Your second problem is one I too have had, and the solution for it, like the one above, I found in the Swede's shop. Just when the heat was ready to pour, a large double handful of tempered molding sand was put on top of the lip and tamped down with a round wooden stick which, when drawn out, left a crucible lip lined with about ½-in. of green sand. When the heat was poured, the lip was cleared of molding sand, slag, etc., with a rod on which a short foot had been bent, leaving the crucible lip just like new. This idea I put into standard practice here at the foolish faucet works, and I have had 100 per cent success with it. Also, it will in every case prevent lip leakers from a cracked lip or one broken from the pot or with a hole in it.

Sincerely,
*Charlie*

## GIFS Chicago Management Group Quarterly Meeting

George T. Edwards, president, Woodruff & Edwards Inc., Elgin, Ill., addressed the quarterly luncheon meeting of the Chicago Area Management Group of the Gray Iron Founders' Society, Feb. 21. Chester R. Lindgren, president, Lindgren Foundry Co., Batavia, Ill., the new chairman of the group, presided at the meeting held at the Gramere Hotel.

Mr. Edwards described his experiences in Japan last June and July as a member of a group of American businessmen sent to that country by the Foreign Operations Administration. Through his contacts with Japanese engineers and foundrymen and visits to numerous foundries, he formed some interesting impressions. Foremost among them was the lack of mechanization in production of castings. Mass production in this foundry is virtually unknown by American standards.

The group discussed the current scrap situation at some length. Recent high prices for melting material are proving troublesome. Plans are being formulated for another joint meeting with the Milwaukee group in late May or early June.


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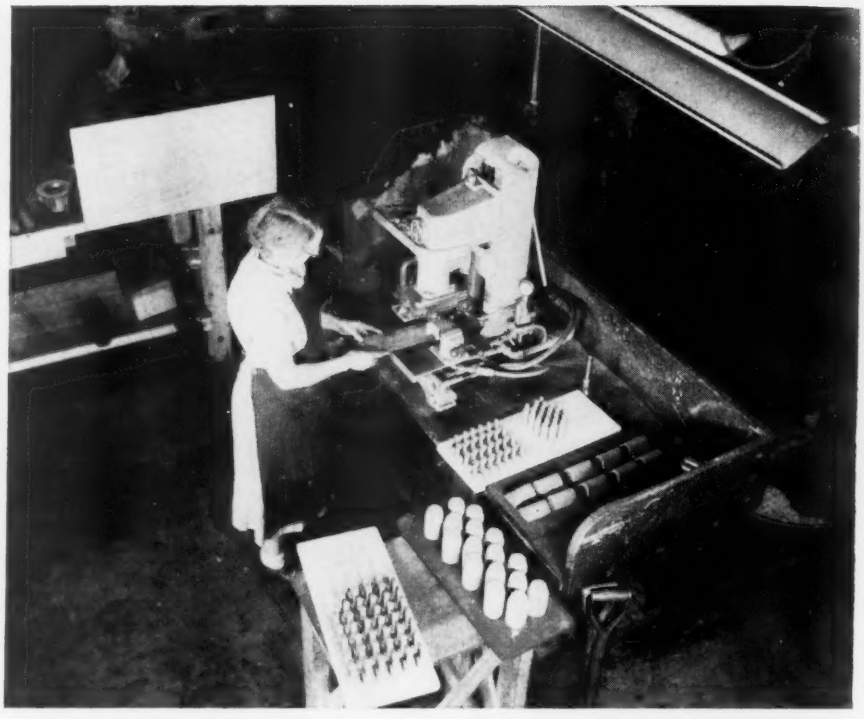
# MATHEWS

# Speaking of Coreblowers

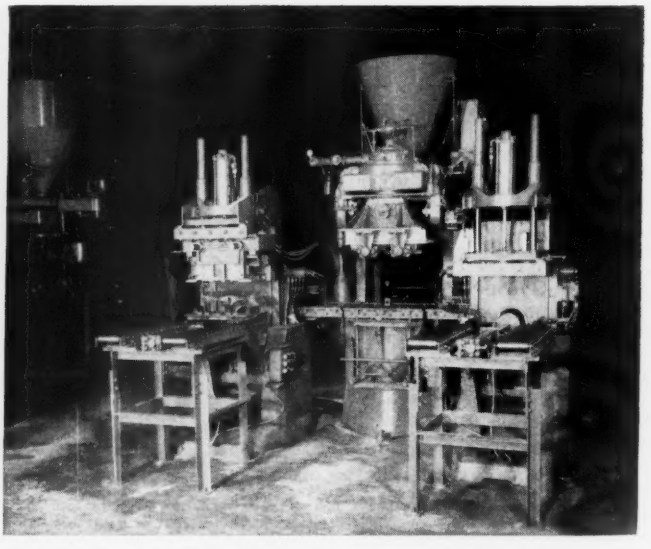
Successful foundry operators know the importance of keeping costs in line — all along the line. They also know how important the core room is to the whole cost picture, for any inefficiency there will very soon be reflected in foundry and cleaning room costs. The foundries here — both large and small in size — are leaders in efficient operation. Their core room operations are outstanding.

An important factor in their successful core room operation is their selection of equipment. The core blowers and core blowing and handling units shown are designed for long trouble-free performance and low cost operation. These B&P Flexiblo and Flexiblomatic Units are part of the most complete line of core room machinery available . . . the B&P line. A new bulletin fully describing this machinery will soon be available. Use the reader service card in this magazine or write directly to: Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 North Cicero Avenue, Chicago 39, Illinois, to obtain your copy.



**THE NEW CB5C FLEXIBLO** presents an entirely new concept in bench coreblowing. Entirely automatic in its operation, the CB5C is actuated by push-button. Clamping, blowing and unclamping are automatically sequenced to assure perfect cores on every cycle. A draw model — the CB5CD — provides a full two-inch draw, and the capacity of either model is 4½ pounds per blowing cycle.

**THIS CR CORMATIC UNIT** combining a B & P Flexiblomatic Core Blower and a B & P CR Rol-A-Cor Machine handles the entire core production job. It indexes and clamps the core box, (handles boxes with side-draws too) blows the core, unclamps the box, indexes it to the CR, rolls it over, draws the box and returns it to the blower for another cycle . . . all automatically.



**THIS DUAL CR CORMATIC UNIT** combines a single Flexiblomatic Core Blower with two Rol-A-Cor machines. It also does the complete core box handling, blowing and core delivery job, but its production is far higher than the single CR Cormatic Unit. The Flexiblomatic Core Blower is utilized a greater percentage of the time and the result is far higher production from a single blower.

**BEARDSLEY AND PIPER** DIVISION PETTIBONE MULLIKEN CORPORATION
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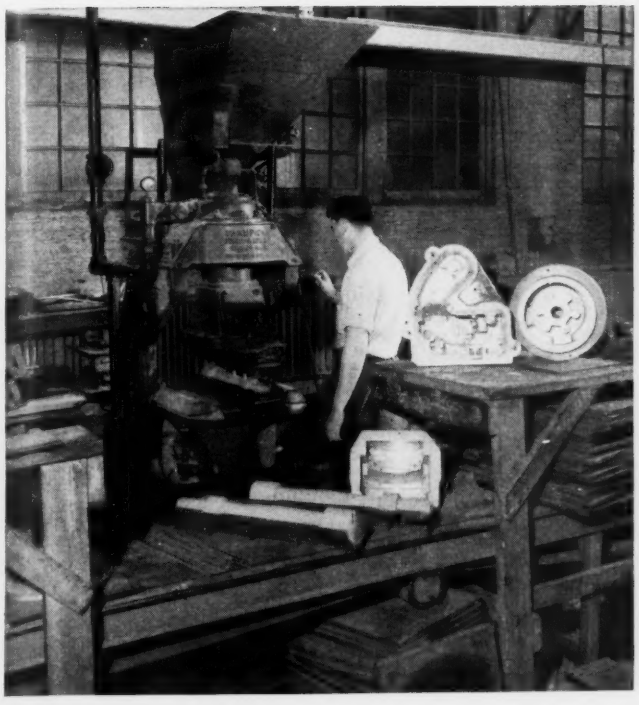
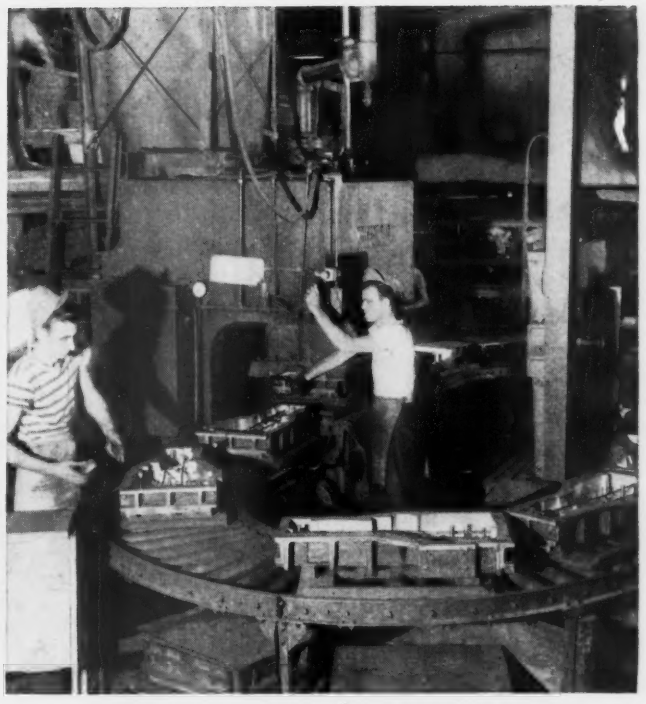
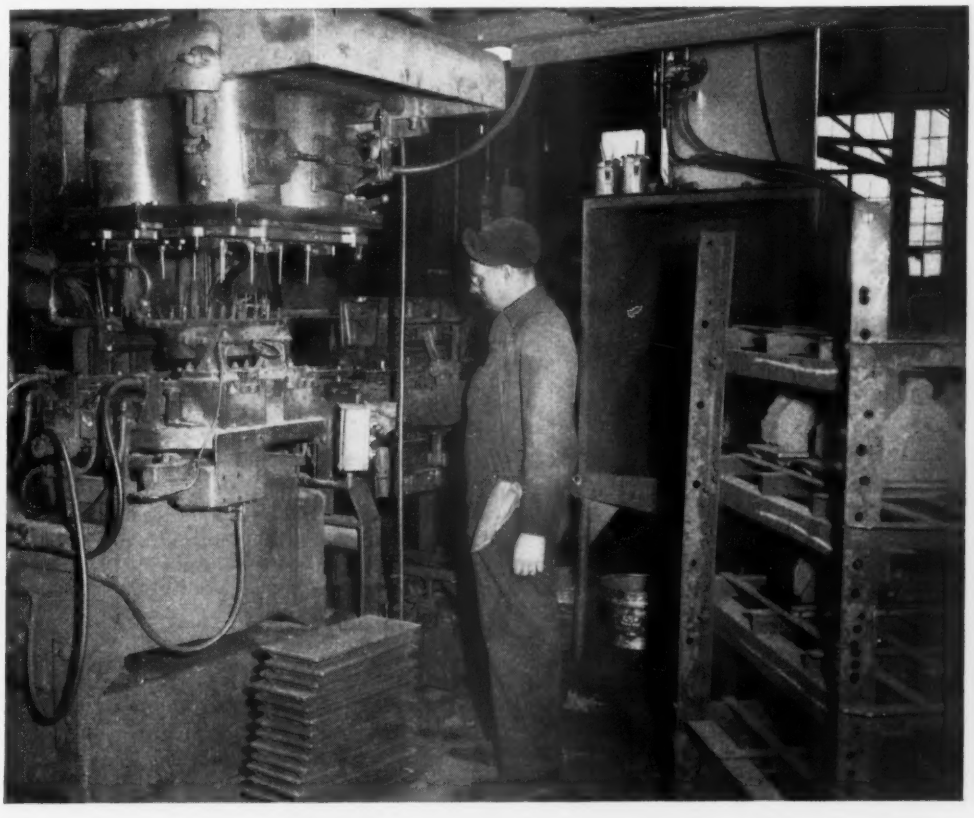


**THE CB12 FLEXIBLO** in this foundry handles a very wide range of different core boxes. Like other Flexiblo Core Blowers, the CB12 can blow horizontally-split, vertically-split, or open-face core boxes. A full 6½ inch draw is provided for horizontally-split boxes where the upper half of the box is attached to the blower magazine, or for one piece boxes attached to the blower magazine.



**THE BIG PRODUCTION JOBS** are handled with Flexiblos, too. This CB400 Flexiblo served by a loop roller conveyor and B & P Rol-A-Draw rollover and draw machine produces big half-barrel cores for heavy diesel engines. Twelve different half-barrel core boxes are in production simultaneously. Cores weighing up to 300 pounds may be blown on the CB400. Like other Flexiblos, the CB400 handles all types of core boxes.

**THE HIGHEST PRODUCTION SINGLE-OPERATOR** unit in operation today is the TR Cormatic which combines a B & P Flexiblomatic Core Blower with a TR Rol-A-Cor rollover and draw machine. Production rates of up to 300 per hour are obtained on highly repetitive work. The unit handles two different core boxes simultaneously and accomplishes the entire job — clamping, blowing, indexing, rollover, draw, and core delivery — without auxiliary equipment. All operations are automatically sequenced and controlled, and the unit is all-pneumatic in operation without electrical contacts, switches or relays. The operator need only depress the air control buttons and remove the finished cores from the delivery rack . . . all other operations are performed by the machine.

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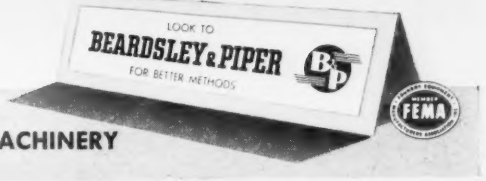


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# Obituary

**BAILEY D. HERRINGTON,** sales engineer in northwestern Pennsylvania for Hickman, Williams & Co., died Feb. 26. He joined the company in 1925 and supplemented his work by attending evening courses at Car-

BAILEY D. HERRINGTON

negie Institute of Technology. A charter member of Northwestern Pennsylvania Chapter of the AFS, Mr. Herrington was its chairman last year.

**Samuel F. Frankel,** 57, secretary-treasurer, Badger Foundry Co., Winona, Minn., died Feb. 22. Mr. Frankel joined the company in 1916 and became secretary and treasurer in 1925. He served in that capacity and handled sales in Racine, Wis., later moving to Winona with the company. Mr. Frankel was also secretary-treasurer of Northern Aluminum Foundry Co., North Fond du Lac, Wis.

**John F. Stuckie,** 74, since 1952, technical advisor, Allied Casting Corp., Scranton, Pa., died Mar. 26. A veteran of 60 years in the foundry industry, Mr. Stuckie was in the foundry department of Lackawanna Railroad for 50 years.

**Everett E. Smith,** for 13 years foundry manager, A. B. Farquhar Co., York, Pa., died recently. Mr. Smith was a broker of castings and foundry supplies since 1952, when the company was acquired by Oliver Corp., Chicago, and the foundry was closed.

**G. Norman Knaus,** president, Syracuse Foundry Inc., Syracuse, N. Y., died Mar. 28 in Florida.

**John T. Hepburn,** founder and president, John T. Hepburn Ltd., Toronto, died recently. The com-

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The improved
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The new
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Helps assure low-cost, sound, uniform non-ferrous castings. Resists rough usage. "Protected Type" and "Bare Metal" thermocouples instantly interchangeable. Ranges from 1000-2500°F. Write for Catalog No. 155.

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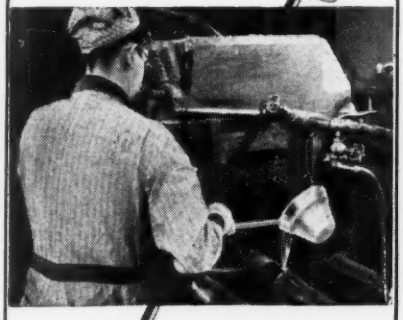

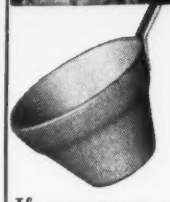

*Available with or without handles — in stainless steel and mild steel.*

If you pour non-ferrous alloys — now, more than ever, Spincraft ladles belong in your plant. You can select from 23 practical sizes (from ¼ lb. to 30 lb. capacity in molten aluminum) — in top quality stainless steel — for *less* than you've ever paid before.

And . . . experience shows new Spincraft ladles actually cost less to use. Here's why —

**Reinforced cup bottom and pouring edge** have been spun to a heavier gauge than the weight-saving side walls. This means you get easier handling, better heat transfer, and reduced "burnouts" for longer ladle life. Handles are "whack-proof". Cup surfaces are specially finished to hold any type of ladle coating longer.

**Hand any operator a new Spincraft ladle — and the next day try to take it away from him!** You'll see how the practical conical shape, the built-in overall balance, minimizes spillage as he "swings" from crucible to machine or mold. Notice how every motion takes less effort. And there's a reason: — for example — a Spincraft stainless steel ladle in the 65 cu. in. size weighs from 2 to 11 pounds *less* than conventional cast or malleable iron, forged or pressed steel ladles.

**Order Spincraft ladles for your plant.** Cut operator fatigue—pour more metal, for greater efficiency and profit.

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**4138 W. State St., Milwaukee 8, Wis.**


pany, founded more than 50 years ago, operates a gray iron foundry as one of its divisions.

**Edward J. Walsh,** production manager, Adirondack Foundries & Steel Inc., Watervliet, N. Y., died Feb. 22. Mr. Walsh was associated with the company for 30 years.

**Charles M. Brennan,** 75, former president, New Haven Malleable Iron Co., New Haven, Conn., died Feb. 26, in Palm Beach, Fla.

**Martin Rothschild,** 60, one of the founders and president, Interstate Smelting & Refining Co., Chicago, died Mar. 19.

**Alan Arensberg,** 42, president, Vesuvius Crucible Co., Pittsburgh, died at his home there Mar. 23.

**Henry B. Hanley,** until his retirement last year, manager of the Foundry Division, American Laundry Machine Co., Rochester, N. Y., died Mar. 20. He was associated with the company for 25 years. A pioneer

HENRY B. HANLEY

in work on sand research and technology, Mr. Hanley developed a patent on production of synthetic molding sands. During World War I he was metallurgist and foundry superintendent, New England Ship & Engine Co., Groton, Conn. Mr. Hanley was a former director of the American Foundrymen's Society and the Gray Iron Founders' Society. One of the founders of Rochester Chapter of the AFS, he was its first president. In 1922, he prepared the American exchange paper to the International Congress of Foundrymen, Paris.

**Russell C. Mahon,** 66, founder and board chairman of the R. C. Mahon Co., Detroit, died in that city on Mar. 30.


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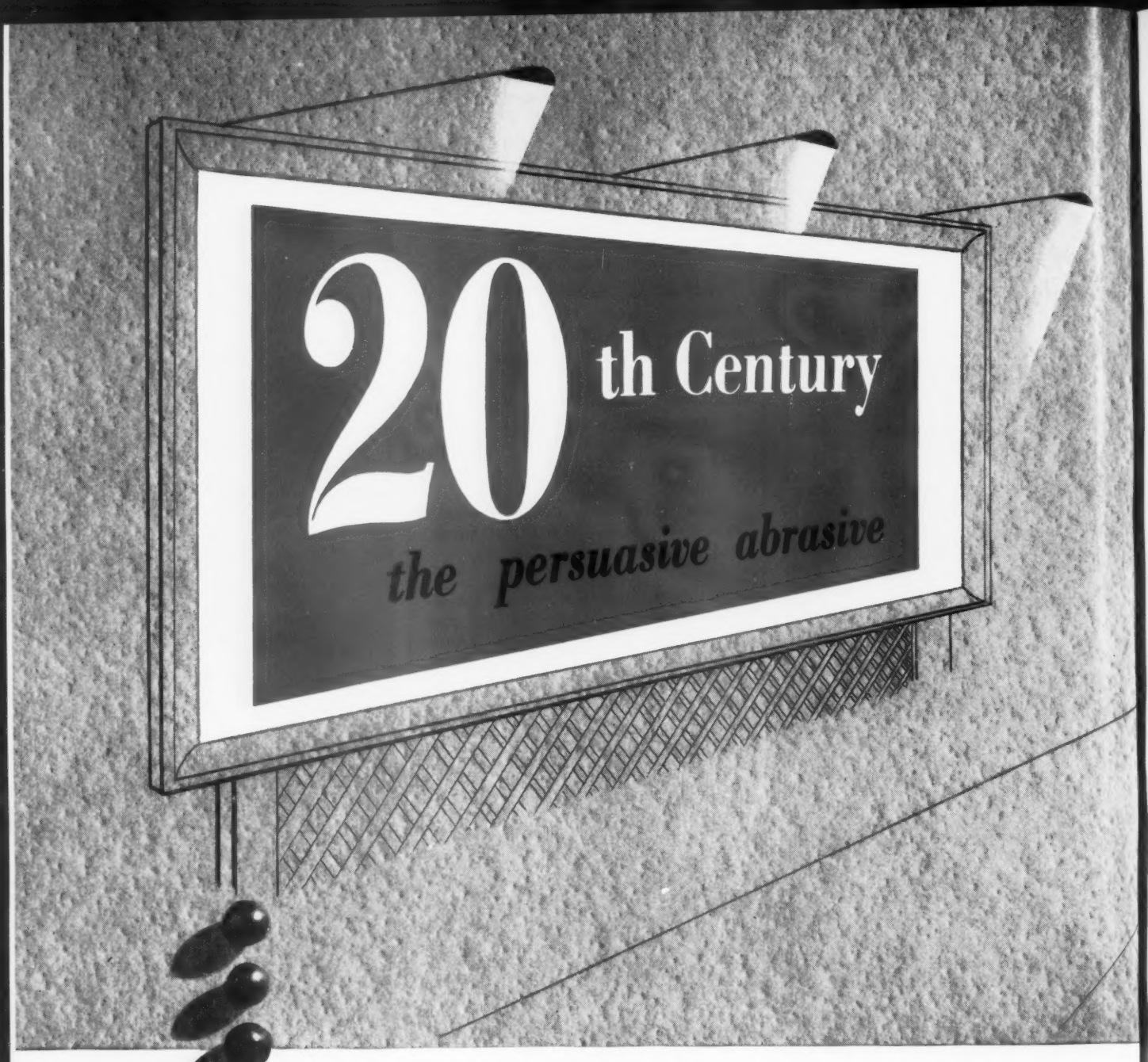



# .....sign of quality

Here's the sign that can mean so much to you.

It's your assurance of premium quality metallic abrasives for any cleaning or peening requirement. Choose our *Normalized line, for example, which lasts as much as four times longer than other abrasives. Or our Toledo Realsteel, produced in our new Toledo Steel Shot Division, for consistently high uniformity.

Remember, when you buy 20th Century, you buy top performance.

*Write for our catalog today.*

**The CLEVELAND METAL ABRASIVE Co.**
800 East 67th St., Cleveland 8, Ohio
Howell Works: Howell, Michigan
Toledo Steel Shot Division: Toledo, Ohio
One of the world's largest producers of quality shot and grit — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)
*Copyrighted trade name

# Foundry Statistics

## MALLEABLE IRON

(Shipments of castings—net tons[1])

| | Shipments | | Unfilled Orders[2] |
|---|---|---|---|
| | Total | For Sale | |
| 1953 | 970,506 | 578,749 | ..... |
| 1954 | | | |
| Dec. | 80,599 | 49,005 | 85,064 |
| Total | 812,016 | 461,982 | ..... |
| 1955 | | | |
| Jan. | 82,028 | 48,000 | 99,817 |
| Feb. | 85,979 | 48,721 | 101,766 |
| Mar. | 102,364 | 60,063 | 99,730 |
| Apr. | 101,226 | 57,397 | 104,091 |
| May | 98,397 | 57,317 | 106,446 |
| June | 99,456 | 60,261 | 107,559 |
| July | 75,570 | 44,914 | 115,420 |
| Aug. | 82,448 | 48,126 | 123,473 |
| Sept. | 87,215 | 55,471 | 116,636 |
| Oct. | 90,866 | 53,804 | 121,261 |
| Nov. | 99,280 | 58,069 | 116,981 |
| Dec. | 99,946 | 60,409 | 123,107 |
| Total | 1,104,775 | 652,552 | ..... |

## ALUMINUM

(Shipments of castings—1000 pounds[1])

| | Shipments | | | | Unfilled Orders[3] |
|---|---|---|---|---|---|
| | Total | Sand | Perm. Mold | Die | |
| 1953 | 658,022 | 214,553 | 200,025 | 239,330 | ..... |
| 1954 | | | | | |
| Dec. | 64,045 | 13,753 | 23,629 | 26,017 | 99,556 |
| Total | 624,973 | 158,473 | 214,408 | 245,291 | ..... |
| 1955 | | | | | |
| Jan. | 64,414 | 13,358 | 23,679 | 26,819 | 102,382 |
| Feb. | 66,869 | 13,579 | 24,319 | 28,234 | 108,939 |
| Mar. | 78,958 | 16,019 | 29,029 | 33,229 | 110,046 |
| Apr. | 73,049 | 14,041 | 28,028 | 30,208 | 109,156 |
| May | 71,691 | 14,235 | 25,597 | 31,243 | 104,984 |
| June | 68,473 | 14,920 | 24,682 | 27,939 | 102,799 |
| July | 55,033 | 11,716 | 21,006 | 21,656 | 101,024 |
| Aug. | 64,864 | 14,916 | 22,267 | 27,004 | 105,994 |
| Sept. | 67,069 | 14,769 | 23,075 | 28,532 | 111,696 |
| Oct. | 72,197 | 14,485 | 25,135 | 31,741 | 120,222 |
| Nov. | 75,065 | 14,327 | 26,267 | 33,852 | 126,954 |
| Dec. | 75,275 | 15,291 | 25,031 | 34,317 | 123,363 |
| Total | 832,957 | 171,656 | 298,115 | 354,804 | ..... |

## COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

| | Shipments | | | Unfilled Orders[3] |
|---|---|---|---|---|
| | Total | Sand | Perm. Mold | |
| 1953 | 990,496 | 888,369 | 61,316 | ..... |
| 1954 | | | | |
| Dec. | 72,421 | 65,159 | 4,346 | 32,054 |
| Total | 835,930 | 753,179 | 48,848 | ..... |
| 1955 | | | | |
| Jan. | 72,233 | 64,540 | 4,678 | 30,864 |
| Feb. | 75,253 | 67,768 | 4,598 | 37,520 |
| Mar. | 92,149 | 83,149 | 5,649 | 42,940 |
| Apr. | 84,183 | 75,903 | 5,152 | 51,111 |
| May | 85,008 | 76,064 | 5,513 | 49,198 |
| June | 90,476 | 80,869 | 5,840 | 45,820 |
| July | 65,816 | 59,138 | 3,998 | 48,085 |
| Aug. | 87,206 | 77,721 | 5,322 | 51,251 |
| Sept. | 89,600 | 80,481 | 5,603 | 57,313 |
| Oct. | 91,192 | 82,958 | 4,513 | 56,751 |
| Nov. | 90,345 | 80,934 | 5,807 | 57,049 |
| Dec. | 88,287 | 78,327 | 6,368 | 57,146 |
| Total | 1,011,748 | 907,852 | 82,201 | ..... |

## MAGNESIUM

(Shipments of castings—1000 pounds[1])

| | Shipments | | Unfilled Orders[3] |
|---|---|---|---|
| | Total | For Sale | |
| 1953 | 34,517 | 31,469 | ..... |
| 1954 | | | |
| Dec. | 2,287 | 1,906 | 6,678 |
| Total | 25,777 | 22,950 | ..... |
| 1955 | | | |
| Jan. | 2,305 | 2,067 | 7,236 |
| Feb. | 2,160 | 2,009 | 7,376 |
| Mar. | 2,572 | 2,311 | 7,011 |
| Apr. | 2,633 | 2,405 | 6,800 |
| May | 2,399 | 2,174 | 6,530 |
| June | 2,367 | 2,098 | 6,346 |
| July | 1,920 | 1,763 | 5,912 |
| Aug. | 2,176 | 2,002 | 5,964 |
| Sept. | 2,478 | 2,260 | 5,670 |
| Oct. | 2,302 | 2,077 | 5,394 |
| Nov. | 2,325 | 2,148 | 5,805 |
| Dec. | 2,255 | 2,018 | 5,981 |
| Total | 27,892 | 25,332 | ..... |

## PRODUCTION WORKERS

### Estimated Number
(Thousands)

| | Jan. 1956 | Dec. 1955 | Jan. 1955 |
|---|---|---|---|
| Ferrous | 260,300 | 259,700 | 216,200 |
| Nonferrous | 90,400 | 90,800 | 80,800 |

### Average Weekly Earnings

| | | | |
|---|---|---|---|
| Gray Iron | 83.03 | 85.88 | 78.36 |
| Malleable Iron | 85.91 | 86.93 | 79.79 |
| Steel | 95.04 | 95.92 | 79.79 |
| Nonferrous | 85.63 | 89.44 | 84.03 |

### Average Weekly Hours

| | | | |
|---|---|---|---|
| Gray Iron | 40.7 | 42.1 | 40.6 |
| Malleable Iron | 41.5 | 42.2 | 40.5 |
| Steel | 43.2 | 43.6 | 39.5 |
| Nonferrous | 40.2 | 41.6 | 40.4 |

### Labor Turnover Rate (Jan.)
(Per 100 employees)

| | Total Accession | Total Separation | Quit | Layoff |
|---|---|---|---|---|
| Gray Iron | 3.6 | 3.0 | 1.6 | 0.7 |
| Malleable Iron | 3.8 | 3.8 | 2.1 | 0.8 |
| Steel | 4.3 | 3.2 | 1.6 | 0.8 |
| Nonferrous | 3.1 | 4.8 | 1.5 | 2.6 |

Source: Bureau of Labor Statistics

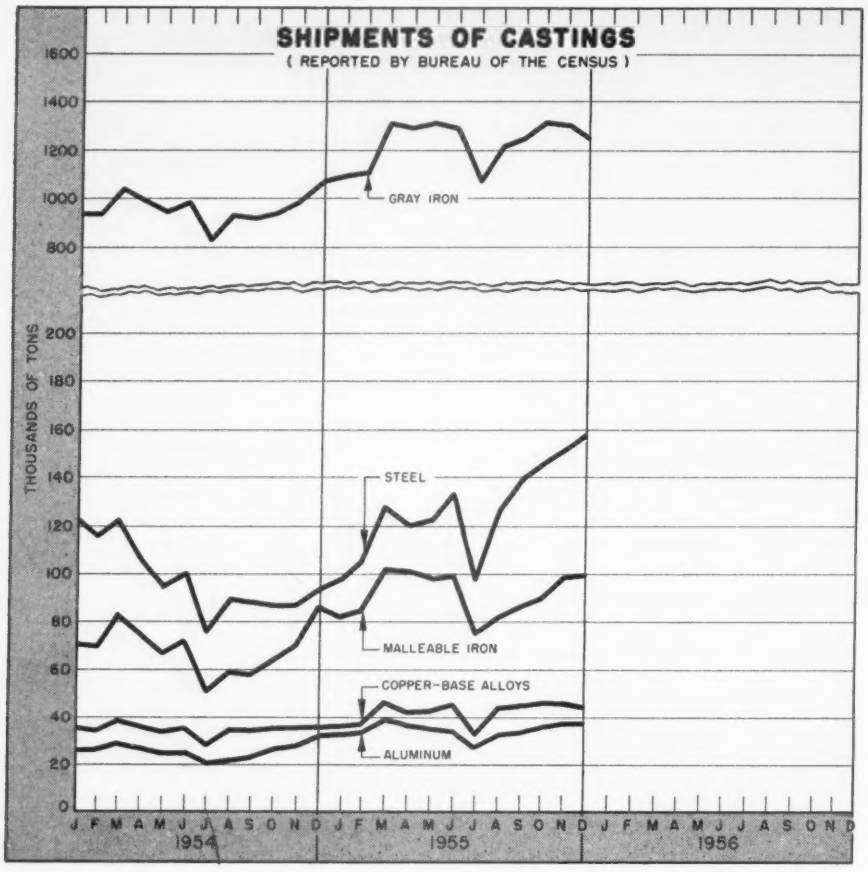
## GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

| | All Castings | | Miscellaneous Castings | | Heavy Steel Ingot Molds | | Chilled Railroad Car Wheels | Pressure Pipe & Fittings | Soil Pipe & Fittings | Unfilled Orders[3] |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | For Sale | Total | For Sale | Total | For Sale | Total | Total[3] | Total[3] | |
| 1953 | 13,707,902 | 7,494,843 | 8,449,837 | 3,675,454 | 2,829,159 | 1,389,483 | 467,142 | 1,285,598 | 677,166 | ..... |
| 1954 | | | | | | | | | | |
| Dec. | 1,074,258 | 563,699 | 680,700 | 276,045 | 200,004 | 97,936 | 27,229 | 111,082 | 55,203 | 744,633 |
| Total | 11,532,158 | 6,322,989 | 7,292,292 | 3,064,886 | 1,784,625 | 843,899 | 325,859 | 1,376,671 | 743,711 | ..... |
| 1955 | | | | | | | | | | |
| Jan. | 1,091,923 | 563,153 | 712,097 | 282,386 | 192,132 | 97,007 | 25,783 | 100,638 | 61,273 | 782,656 |
| Feb. | 1,106,165 | 578,171 | 720,304 | 291,675 | 196,118 | 99,794 | 27,401 | 95,285 | 67,057 | 852,168 |
| Mar. | 1,314,918 | 688,733 | 847,874 | 334,287 | 217,571 | 109,681 | 36,732 | 129,746 | 82,995 | 934,224 |
| Apr. | 1,293,678 | 679,867 | 819,872 | 319,149 | 216,116 | 108,490 | 35,415 | 145,871 | 76,404 | 966,057 |
| May | 1,310,424 | 707,105 | 803,897 | 315,072 | 227,236 | 117,915 | 35,966 | 168,772 | 74,553 | 937,949 |
| June | 1,296,196 | 715,862 | 793,067 | 327,520 | 228,044 | 117,727 | 43,807 | 147,351 | 83,927 | 981,918 |
| July | 1,069,711 | 579,122 | 634,869 | 246,297 | 210,130 | 112,137 | 28,181 | 129,191 | 67,340 | 1,049,565 |
| Aug. | 1,226,312 | 688,317 | 718,423 | 301,502 | 238,007 | 121,071 | 29,298 | 156,074 | 84,510 | 1,160,466 |
| Sept. | 1,252,736 | 712,688 | 731,073 | 314,223 | 244,199 | 124,811 | 29,953 | 165,332 | 82,179 | 1,150,933 |
| Oct. | 1,310,309 | 713,671 | 795,875 | 327,827 | 245,749 | 122,722 | 31,877 | 160,875 | 75,923 | 1,113,336 |
| Nov. | 1,305,633 | 696,523 | 797,854 | 327,580 | 262,506 | 127,739 | 29,795 | 148,560 | 66,918 | 1,061,546 |
| Dec. | 1,259,740 | 663,993 | 786,480 | 328,445 | 262,056 | 133,115 | 30,833 | 133,935 | 46,436 | 1,075,477 |
| Total | 14,837,745 | 7,987,205 | 9,161,685 | 3,715,963 | 2,739,864 | 1,392,209 | 385,041 | 1,681,630 | 869,558 | ..... |

## STEEL CASTINGS—SHIPMENTS (Net Tons[1])

| | All Castings | | | Carbon | | | Alloy | | | Unfilled Orders[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | For Sale | Railway Specialties | Total | For Sale | Railway Specialties | Total | For Sale | Railway Specialties | |
| 1953 | 1,834,197 | 1,400,013 | 321,010 | 1,276,729 | 959,493 | 293,491 | 557,468 | 417,148 | 27,519 | ..... |
| 1954 | | | | | | | | | | |
| Dec. | 93,547 | 69,843 | 12,489 | 62,967 | 45,632 | 10,469 | 30,841 | 24,211 | 1,245 | 179,148 |
| Total | 1,184,096 | 880,158 | 135,581 | 802,321 | 580,474 | 120,309 | 381,285 | 303,428 | 15,315 | ..... |
| 1955 | | | | | | | | | | |
| Jan. | 98,238 | 75,044 | 13,809 | 67,307 | 49,816 | 12,762 | 30,841 | 25,228 | 1,047 | 201,839 |
| Feb. | 106,430 | 80,729 | 16,501 | 74,709 | 55,014 | 15,381 | 38,945 | 25,715 | 1,120 | 202,301 |
| Mar. | 127,460 | 98,926 | 19,339 | 88,867 | 68,013 | 17,887 | 34,933 | 30,913 | 1,452 | 215,059 |
| Apr. | 120,053 | 92,237 | 16,646 | 84,247 | 63,244 | 15,163 | 35,806 | 28,993 | 1,483 | 221,336 |
| May | 122,465 | 92,713 | 16,810 | 85,950 | 63,182 | 15,335 | 36,515 | 29,531 | 1,475 | 225,302 |
| June | 133,887 | 102,457 | 19,591 | 93,417 | 69,986 | 17,979 | 40,470 | 32,471 | 1,612 | 251,416 |
| July | 97,875 | 71,170 | 11,631 | 68,094 | 48,140 | 10,666 | 29,781 | 23,030 | 965 | 354,628 |
| Aug. | 126,406 | 96,290 | 20,576 | 91,245 | 68,514 | 19,094 | 35,161 | 27,776 | 1,482 | 413,531 |
| Sept. | 140,843 | 107,622 | 23,594 | 100,775 | 76,156 | 21,991 | 40,068 | 31,466 | 1,603 | 420,616 |
| Oct. | 145,674 | 110,409 | 23,745 | 105,345 | 79,235 | 22,375 | 40,329 | 31,831 | 1,370 | 418,063 |
| Nov. | 152,381 | 116,908 | 25,635 | 111,517 | 84,064 | 24,050 | 40,810 | 33,518 | 1,585 | 453,113 |
| Dec. | 158,982 | 122,201 | 29,003 | 116,872 | 88,894 | 26,919 | 42,110 | 33,980 | 2,084 | 475,335 |
| Total | 1,530,694 | 1,166,706 | 236,880 | 1,088,345 | 814,258 | 219,602 | 445,769 | 354,452 | 17,278 | ..... |

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.


SHIPMENTS OF CASTINGS
( REPORTED BY BUREAU OF THE CENSUS )
THOUSANDS OF TONS
GRAY IRON
STEEL
MALLEABLE IRON
COPPER-BASE ALLOYS
ALUMINUM
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1954
1955
1956

## COKE PRODUCTION AND CONSUMPTION

(Net tons)

| | Production | Consumption Total | Consumption By Foundries |
|---|---|---|---|
| 1954 | 59,526,723 | 59,139,159 | 2,479,926 |
| 1955 | | | |
| Jan. | 5,805,926 | 5,862,113 | 234,784 |
| Feb. | 5,394,166 | 5,519,241 | 242,282 |
| Mar. | 6,235,909 | 6,306,723 | 286,072 |
| Apr. | 6,135,645 | 6,164,459 | 278,242 |
| May | 6,426,747 | 6,570,567 | 277,967 |
| June | 6,148,026 | 6,297,338 | 249,525 |
| July | 6,169,770 | 6,266,631 | 221,372 |
| Aug. | 6,395,422 | 6,439,101 | 249,425 |
| Sept. | 6,397,133 | 6,501,013 | 260,608 |
| Oct. | 6,630,609 | 6,813,118 | 283,818 |
| Nov. | 6,545,862 | 6,577,008 | 285,021 |
| Dec. | 6,865,032 | 6,949,073 | 284,936 |
| Total | 75,150,247 | 76,266,385 | 3,154,052 |
| 1956 | | | |
| Jan. | 6,915,071 | 6,961,223 | 274,726 |

## INGOT BRASS AND BRONZE

(Shipments in net tons)

| | 1956 | 1955 |
|---|---|---|
| Jan. | 27,736 | 25,201 |
| Feb. | 24,949 | 25,349 |
| Mar. | ..... | 29,713 |
| Apr. | ..... | 27,641 |
| May | ..... | 23,708 |
| June | ..... | 23,141 |
| July | ..... | 18,513 |
| Aug. | ..... | 27,013 |
| Sept. | ..... | 26,349 |
| Oct. | ..... | 25,228 |
| Nov. | ..... | 25,102 |
| Dec. | ..... | 21,448 |
| Total for year | 52,685 | 298,406 |

## ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

| | Shipments Total | Shipments For Sale | Unfilled Orders[2] |
|---|---|---|---|
| 1953 | 521,253 | 349,022 | ..... |
| 1954 | | | |
| Dec. | 54,410 | 35,211 | 69,603 |
| Total | 520,501 | 322,845 | ..... |
| 1955 | | | |
| Jan. | 58,586 | 35,472 | 70,691 |
| Feb. | 58,585 | 35,893 | 73,858 |
| Mar. | 71,811 | 44,048 | 81,363 |
| Apr. | 71,595 | 45,477 | 81,756 |
| May | 63,735 | 38,124 | 74,472 |
| June | 66,569 | 42,753 | 71,344 |
| July | 47,928 | 27,429 | 68,927 |
| Aug. | 62,677 | 61,957 | 75,592 |
| Sept. | 62,030 | 43,498 | 80,660 |
| Oct. | 71,689 | 46,581 | 85,489 |
| Nov. | 75,099 | 47,572 | 93,001 |
| Dec. | 70,950 | 47,547 | 86,120 |
| Total | 781,254 | 516,351 | ..... |

## INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only
(Net Orders Closed, New Equipment)

| | 1955 | 1956 |
|---|---|---|
| Jan. | 81.0 | 195.6 |
| Feb. | 90.4 | .... |
| Mar. | 163.6 | .... |
| Apr. | 178.6 | .... |
| May | 145.7 | .... |
| June | 186.8 | .... |
| July | 213.4 | .... |
| Aug. | 134.0 | .... |
| Sept. | 156.7 | .... |
| Oct. | 108.6 | .... |
| Nov. | 154.4 | .... |
| Dec. | 183.9 | .... |

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

## IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

| | All Scrap Total | By Types of Furnace — Cupola Total | Air Total | Electric Total |
|---|---|---|---|---|
| 1953 | 69,005,976 | 9,676,463 | 1,026,334 | 8,263,880 |
| 1954 | | | | |
| Dec. | 5,075,563 | 798,435 | 82,910 | 566,228 |
| Total | 54,780,758 | 8,542,581 | 855,207 | 6,100,444 |
| 1955 | | | | |
| Jan. | 5,416,052 | 813,682 | 90,622 | 614,824 |
| Feb. | 5,350,452 | 823,465 | 91,916 | 577,296 |
| Mar. | 6,313,717 | 993,266 | 113,198 | 727,401 |
| Apr. | 6,239,036 | 975,751 | 108,965 | 726,138 |
| May | 6,415,947 | 963,082 | 109,074 | 745,060 |
| June | 6,117,573 | 928,908 | 116,419 | 733,573 |
| July | 5,447,130 | 730,735 | 81,216 | 623,623 |
| Aug. | 5,913,031 | 868,644 | 101,607 | 765,343 |
| Sept. | 6,060,491 | 881,158 | 119,550 | 753,318 |
| Oct. | 6,443,349 | 944,685 | 113,411 | 820,642 |
| Nov. | 6,441,351 | 952,906 | 112,056 | 839,971 |
| Dec. | 6,496,796 | 910,675 | 115,436 | 830,404 |
| Total | 72,654,925 | 10,786,957 | 1,273,470 | 8,757,593 |

## PIG IRON PRODUCTION AND CONSUMPTION

| | Production** (Standard grades—net tons) Total | Foundry | Malleable | Basic | Low Phos. Intermediate Low Phos. & Bessemer | Consumption* (By type of furnace—gross tons) Total | Cupola | Air | Electric |
|---|---|---|---|---|---|---|---|---|---|
| 1954 | 58,113,924 | 2,241,436 | 2,798,646 | 47,485,047 | 5,587,465 | 52,373,541 | 4,364,418 | 215,158 | 155,258 |
| 1955 | | | | | | | | | |
| Feb. | 5,394,585 | 209,852 | 252,860 | 4,425,080 | 506,793 | 4,964,515 | 409,141 | 20,576 | 22,551 |
| Mar. | 6,406,902 | 221,437 | 359,413 | 5,239,116 | 586,936 | 5,830,943 | 480,639 | 24,066 | 15,981 |
| Apr. | 6,329,927 | 210,085 | 305,188 | 5,068,506 | 746,148 | 5,725,258 | 467,709 | 21,536 | 12,857 |
| May | 6,753,236 | 246,661 | 342,544 | 5,385,299 | 788,732 | 6,044,882 | 471,657 | 21,448 | 20,085 |
| June | 6,494,838 | 238,412 | 347,631 | 5,245,861 | 662,934 | 5,774,896 | 454,751 | 22,871 | 21,697 |
| July | 6,329,393 | 233,235 | 344,365 | 5,116 960 | 634,833 | 5,430.550 | 361,171 | 16,483 | 19,535 |
| Aug. | 6,529,580 | 251,459 | 319,951 | 5,214,901 | 743,269 | 5,769,689 | 442,532 | 22,014 | 25,685 |
| Sept. | 6,653,578 | 252,630 | 343,919 | 5,397,134 | 659,895 | 5,903,190 | 445,099 | 23,340 | 24,552 |
| Oct. | 6 905.280 | 267,405 | 315.045 | 5,647,527 | 675,303 | 6,193,512 | 470,610 | 22,659 | 23,328 |
| Nov. | 6,636.649 | 241,727 | 353,713 | 5,404.584 | 636.625 | 5,973,223 | 469,485 | 22,621 | 18,148 |
| Dec. | 6,887,667 | 242.446 | 329.607 | 5.660,307 | 655,307 | 6,131,680 | 444.459 | 23,520 | 21,971 |
| Total | 77,114,073 | 2,858,957 | 3.884,971 | 62,570,394 | 7,799,751 | 68.944,698 | 5,326,534 | 260,008 | 246,406 |
| 1956 | | | | | | | | | |
| Jan. | 6.985.945 | 210.755 | 317.216 | 5,806,140 | 651.774 | ..... | ..... | ..... | ..... |
| Feb. | 6.539.199 | 229.440 | 370.208 | 5,350.650 | 588.901 | ..... | ..... | ..... | ..... |
| Total | 13,525,144 | 440,195 | 687,484 | 11,156.790 | 1,240,675 | ..... | ..... | ..... | ..... |

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

# NEW...

## automatic molding machine

## by OSBORN

BLOW PLATE

OSBORN

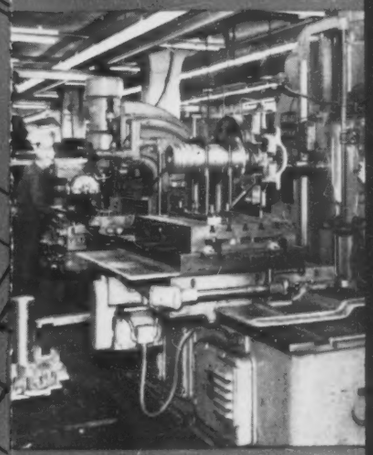
CORE BLOWERS MOLDING MACHINES

INDUSTRIAL BRUSHES

## THE RESUL

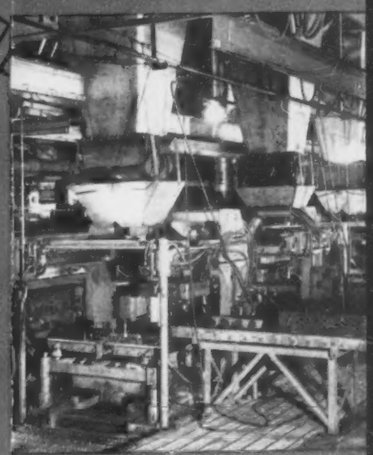
### ADVANCED ENG

Osborn's new MOL-DEX combi
engineering advancements made by
improving the design of automat



### PRECISION MAN

The manufacturing experience
Osborn's new MOL-DEX set a
cision and dependability.



### EXPERIENCE IN AP

The production economies of the
the result of Osborn's knowled
equipment can improve foundry p

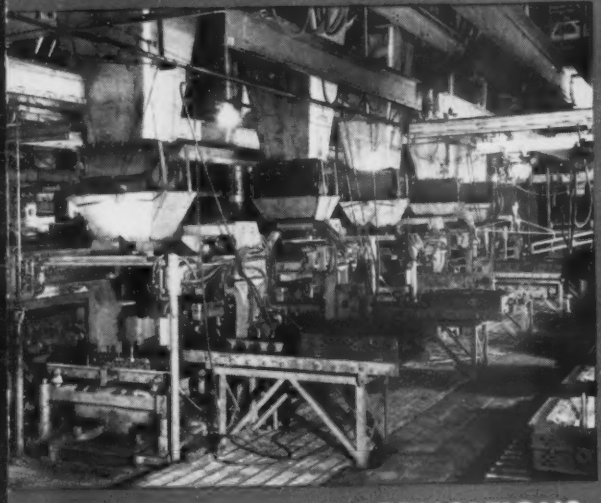
# THE RESULT OF

## ADVANCED ENGINEERING

Osborn's new MOL-DEX combines all the outstanding engineering advancements made by Osborn in continually improving the design of automatic equipment.

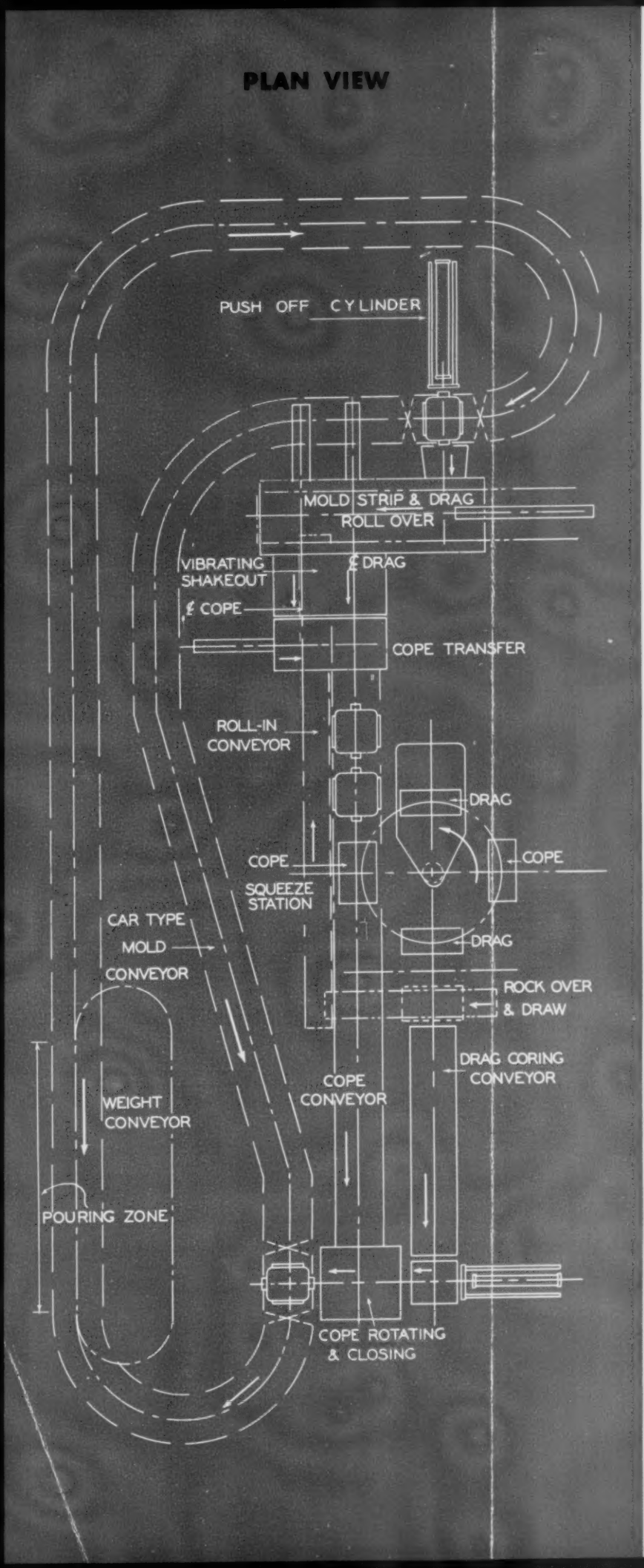
## PRECISION MANUFACTURE

The manufacturing experience and skill built into Osborn's new MOL-DEX set a new standard in precision and dependability.



## EXPERIENCE IN APPLICATIONS

The production economies of the new MOL-DEX are the result of Osborn's knowledge of how automatic equipment can improve foundry processes.



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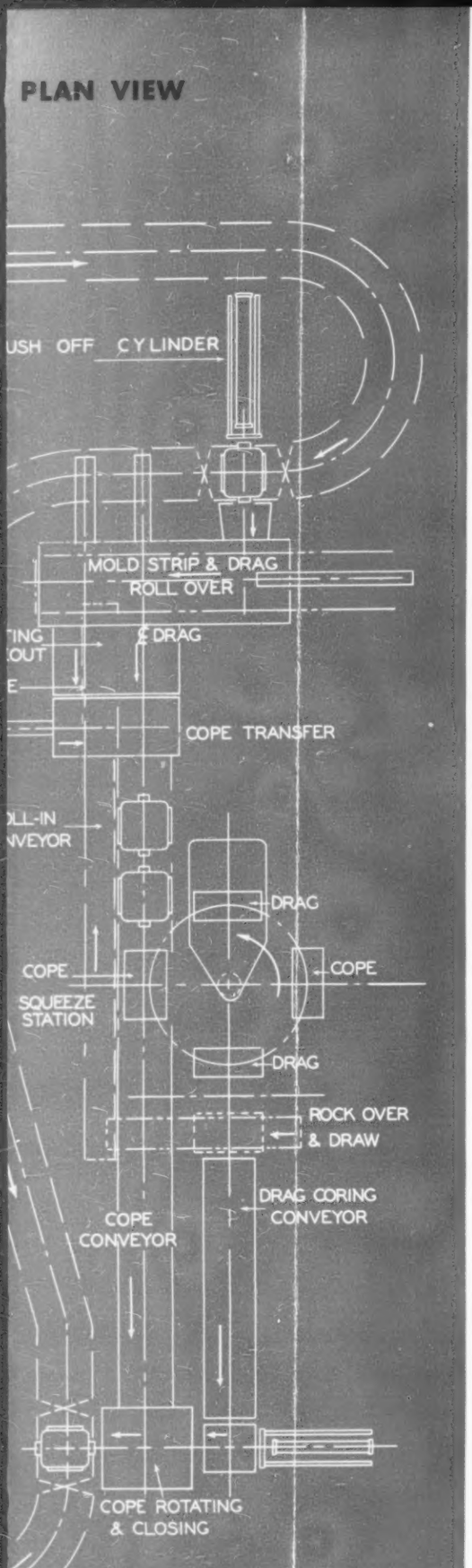

# OSBORN MOL-DEX*

## A highly flexible automatic molding machine suitable for semi-production foundries

● Osborn's new MOL-DEX is a fully automatic molding machine whose flexibility—quick pattern changes—makes it extremely profitable for semi-production as well as high production foundries.

MOL-DEX is the first automatic molding machine to incorporate the stripping of copes and rockover of drags in a single piece of equipment. This design feature results in a greater flexibility of application than ever before achieved.

The new MOL-DEX is another example of the many progressive developments made by Osborn to improve foundry methods. *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

*Trade-Mark

**See the New MOL-DEX in our Exhibit at the 1956 Castings Congress, Atlantic City, May 3-9**

*Leader in automation for the foundry*

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CORE BLOWERS MOLDING MACHINES

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MEMBER FEMA FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, INC.

# Supervisors Report on Getting the Job Done

## *Here Are Tips from 25 Successful Foremen*

By Ernest W. Fair

THE biggest job of every shop supervisor or foreman is to secure the continued and whole-hearted cooperation of the men under his direction. Not many years ago the supervisor with the best record was the one most accomplished at being an iron taskmaster. That day has disappeared.

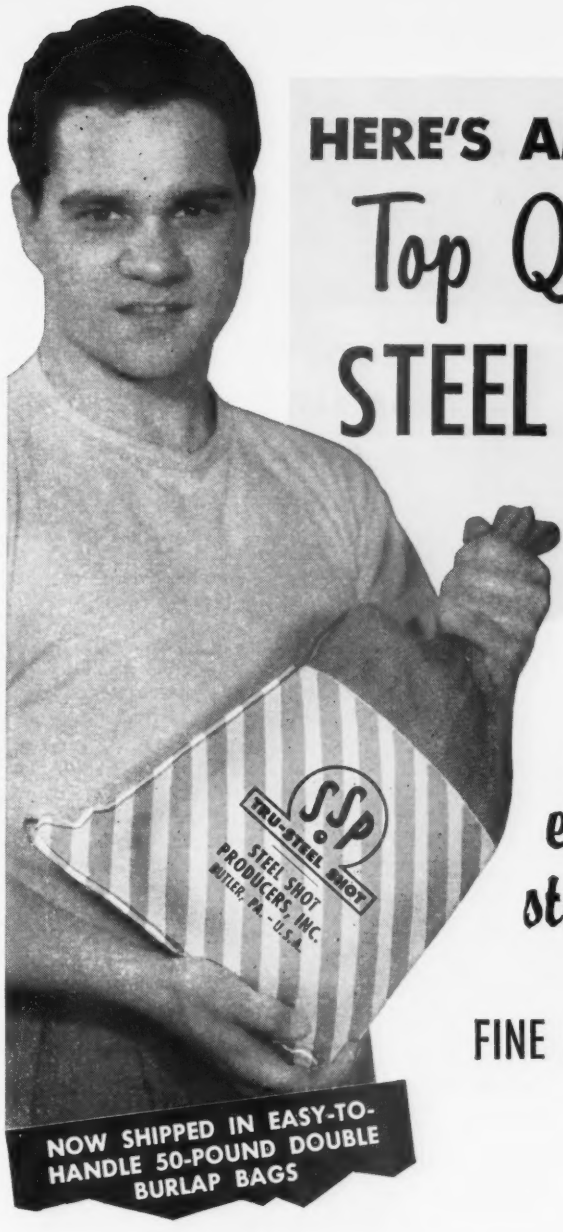
In our time, it takes many skills, ideas and plans for the modern supervisor to fill his role successfully. He must search constantly for methods of procedure which will assure maximum return from payroll dollars spent by the company in his department.

Getting the job done becomes more complicated, requires added strategy and the use of every possible method developed in business today. Recently, 25 successful supervisors were asked about their pet methods of getting maximum results from the men and women under them. Here, in brief form, are their answers.

1. My job is to get things done through people, and I never let myself forget it. Every step I take is planned toward that goal. The hardest thing I had to learn was that I was not a ringmaster or watchdog over the people in my department. When this clear understanding of my real role as a supervisor came to me, results were better and my work was made a lot easier.

2. The most important single thing that has enabled me to get more done in my particular department is, I am sure, a rule of my own which calls for my always making sure that every man gets full credit for any job well done. I have found that a sure way to discourage initiative and extra effort on the part of the people under you is to overlook such things. Even where we have a bonus for such work, I've found the men are just as eager for the recognition of what they have attained as they are for that bonus.

3. I try to lead rather than force my people to do the job. Whenever a difficult task comes up, I have found it cleared away much faster when I stepped in and took the lead, rather than pointed it out and told the men to get the job done themselves. It always results in any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Steel-Grip offers a complete line of safety apparel for every foundry need. Note especially the Steel-Grip designs in new materials extremely resistant to heat, molten metal splash, acids, caustics, abrasion and wear. Since 1910, quality manufacture from selected materials has been our standard practice. We offer correctly designed safeguards, in leather, duck, Perma-Proof materials, asbestos, wool, Dynel cloth, Jaxcolite-coated materials, aluminum-coated materials, etc. They give long wear, uniform dependability at the lowest man-hour costs . . . the real measure of value. Don't buy on appearances or first price. Buy safeguards like you would buy machines . . . on performance. Buy tested and proved Steel-Grip safeguards and watch your costs go down. Write today for complete catalog.

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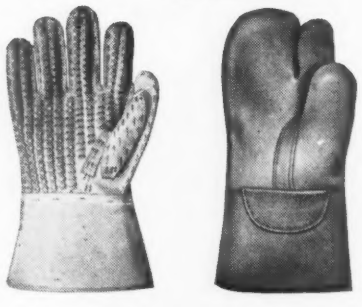
A Steel-Grip "first". Steel-Grip has own laboratory, tests all its raw materials. Our tests show following specifications give longest wear, greatest strength: Minimum of 83% asbestos, maximum of 17% long fiber cotton content. 20 warp ends per inch, 10 woof ends per inch. Minimum weight 2.47 lbs. per yard. Warp tensile strength min. 145 lbs. Woof tensile strength min. 65 lbs. Every Steel-Grip asbestos safeguard certified to you to meet or beat these specifications. Your guarantee. Demand this certified label. Coats, pants, gloves, mitts, etc.



### STEEL-REINFORCED LEATHER GLOVES AND MITTS

Finest quality chrome-tanned leather, in varying weights with varying degrees and styles of steel reinforcement, according to the conditions of the job. Afford the utmost in wear and abrasion resistance.


given job being performed in far less time than under the old method.

4. The biggest thing I've learned in being a supervisor is that you have to be constantly on guard to make sure you never hurt any employee's pride. Sure, you can hire the kind of people who have little pride and are never affected by anything you may do, but they're not the kind of employees who make any supervisor's job easier for him. Pride is a mighty important ingredient in any worthwhile worker. Guard it with care and caution.

5. The one thing I use to keep my department operating smoothly that I think is of most importance is that I keep studying each man to make sure what particular incentives affect that individual the most. I doubt there are any two alike. When I've found the one which gets top results from any individual, then I know how to handle him. It sometimes takes several weeks to discover what it is, but after that there's a lot of smooth sailing.

6. One thing I've found mighty important is to explain everything. Just telling a man to do something or taking it for granted that he understands all about the problem causes a lot of extra make-up work afterward and sometimes creates costly slowdowns.

7. I set the example I want them to follow. No department in any company is any better than the example set by the supervisor. If he takes a sloppy attitude toward the job, his men can't help but follow suit. If he sets an example of initiative, love of his work, interest in every job, etc., his men always will follow suit.

8. I have found the most important single thing in getting the job done is to be extra careful of what you say and how you say it. When you do that, your words will mean something to the people toward whom they are directed. By doing this, you also cut down possibilities for misunderstandings and mistakes.

9. My chief policy is to promote a competitive spirit among the men in my department. Competition always makes for better results even if for nothing more than to see who can keep his work the cleanest, turn out the least number of errors or some other element strictly between the men themselves. One word of caution: Make sure that it's not belligerent competition.

10. To me it's most important that a supervisor learn to be a good listener rather than to dominate completely every conversation he has on

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When it comes to blast cleaning, a foundryman can't believe claims and promises. He has to see for himself the kind of finishing job an abrasive does. His next question is: What does it cost in operation? Different jobs may require different abrasives but the result should always be the same—the best job at *lowest* cost. Malleabrasive and Tru-Steel abrasives give you that. Whichever you need, Pangborn has the right abrasive for your job. Talk to one of our sales engineers, or write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Maryland.

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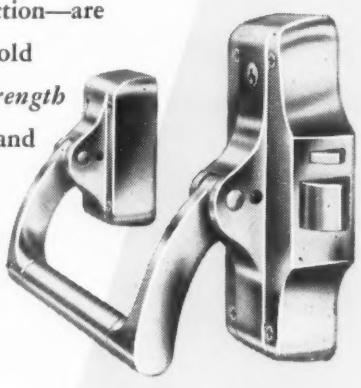
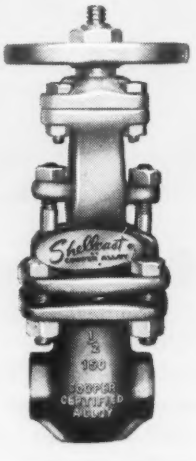
● Smoother castings — uniformity — faster, more economical shell mold production—are obtained with Schenectady Shell Mold Resins, because their *high pouring strength* allows you to cast to close tolerances and eliminates warped or cracked shells.



Moreover, their *superior tensile and transverse strengths* produce strong, uniform shells, while the *excellent hot rigidity* characteristics of these Resins insure straight, rigid shells.

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the job with the men under him. When you're a good listener, you draw your men out—get them to thinking more about the work, developing their own ideas and taking a greater personal interest in the job.

11. To me the big thing in getting the job done is in keeping a smoothly running operation. I've found one sure way to assure that is to bend over backward to avoid playing favorites. Then everyone on the staff works better with the other fellow on the job.

12. I try to locate troubles before they break out. Just about 25 per cent of my time is spent doing this. Experience has taught me it's a lot easier to patch up something before it comes to the surface than to clean up after it has boiled over.

13. I always keep a favorable attitude toward the company. What gripes I have against the front office, I keep to myself. I've noticed that where supervisors air their dislikes in front of their men, the efficiency drops right there, and soon the whole group is doing the same thing.

14. Patience is the greatest asset any supervisor can have in handling any man or any problem. Until he learns patience, he can't call himself a good foreman. With it, you never make snap judgments.

15. The toughest job any supervisor ever faces is in disciplining one of the employees under him. It's a point at which he can start a chain reaction which will lead to an explosion of future trouble for him. I make sure I have all of the facts before I ever discipline any employee. That's kept me from making mistakes which could have disrupted my whole department later on.

16. My pet method of getting the job done is to find every opportunity I can to praise individual employees for their work. It accomplishes wonders. But it can be dangerous if overdone; you have to learn the proper balance and adhere to it.

17. I'm careful to avoid prejudice against any individual employee. If he has feelings, traits or actions I dislike, I ignore them completely as long as that individual does a good job. I've seen too many cases where supervisors let prejudices against certain employees ruin all of the other good things they have done and completely mess up their departments.

18. To me, one of the most important things you can do is never to overlook an opportunity to build up a man's job in his own estimation;

the man who is proud of his job always does more for you with less trouble.

19. I keep building on each employee's future with the company. I've found the men under me have to have goals toward which to work hard; without them they never have the incentive to do anything extra. I never overlook an opportunity to do this.

20. A supervisor has to dish out criticism; that's one of the reasons he's in his job. But I've found there are two ways to do it, that is, constructively or destructively. The former gets the best results. Whenever I criticise any employee, it's done constructively, and I've always had good results with this approach.

21. Show interest in and appreciation of a man's work; that makes him a better man and easier to handle. Confine your efforts to keeping him working, and he'll use every dodge he can think of to keep from doing anything extra.

22. My pet rule is always to discuss every job problem with the men involved. Following it has done more for me in my department than anything else I've ever tried to do. You get more willingness to do something extra from your men when they have a chance to help you work things out.

23. One of my pet methods of getting the job done in my department is to give my men things to work up on their own. That keeps them from being mere machines. It keeps them alert. It enables them to have that something extra when they have to think out a problem by themselves as the result of an emergency.

24. I carefully avoid making promises that I may not be able to fulfill. I've found that's a bigger source of resentment by employees against their supervisors than anything else. When it involves the company, I make sure first it will be delivered before I promise my men that anything will be done.

25. I try to be consistent in my approach to all of the problems concerned with my department. I've found the men then never are afraid of my moods or uncertain about what I will do. It also helps them work out a lot of problems on their own.

"That was convincing, Eddie . . . Here come Mac and Charlie to the rescue!"

## AFS Plans Education Seminar

American Foundrymen's Society plans an education seminar for teachers of foundry and patternmaking in the vocational schools and high schools. Scheduled for June 14, 15 and 16, the seminar will be held at the Kellogg Center, Michigan State University, East Lansing, Mich. Instructors and their immediate supervisors (principal, director, superintendent) who are presently teaching foundry and/or patternmaking with demonstration facilities, are eligible for the course.


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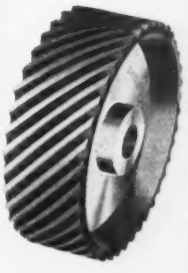

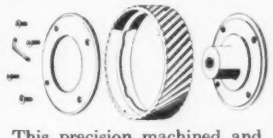

This precision machined and accurately balanced wheel is easily and quickly knocked down and reassembled for economical tire replacement or change.

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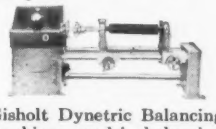

Gisholt Dynetric Balancing machine—used in balancing all Chicago Rubber rolls.

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Rollers for every specific job—for steel, tin plate, paper and textile mills and all operations where high quality rubber rollers are used. Dynamically balanced, available in a wide variety of Durometers. These rolls are made in various diameters and serrations to suit any polishing requirements.

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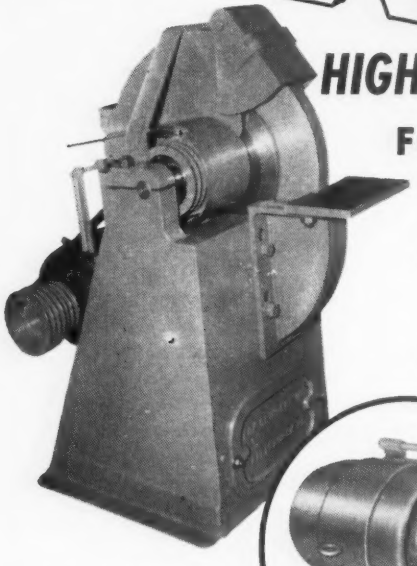
## Electromet Celebrating Its 50th Anniversary This Year

Fifty years of production and development are being celebrated this year by Electro Metallurgical Co., Division of Union Carbide & Carbon Corp., New York. A major producer of ferroalloys, Electromet was organized in 1906 with plants at Niagara Falls, N. Y., and Glen Ferris, W. Va. Ferroalloy production had begun at Glen Ferris in 1901.

In 1906, Electromet produced only high-carbon ferrochrome and ferrosilicon. Today it produces more than 100 grades of alloys and alloying metals. Major alloys of ten elements are produced in both standard and special grades: Chromium, manganese, silicon, vanadium, tungsten, zirconium, columbium, boron, calcium and titanium. In addition, various grades of the company's alloys contain cerium, magnesium, calcium, barium, molybdenum, aluminum, nickel and tantalum.

Today, Electromet has seven plants strategically located throughout the country. Four have their own power plants, to assure an uninterrupted supply of electrical power. A new plant also is under construction at Ashtabula, O., to produce titanium sponge. When completed in the second quarter of this year, it will be the first commercial plant in the U. S. to produce titanium sponge by the sodium reduction process.

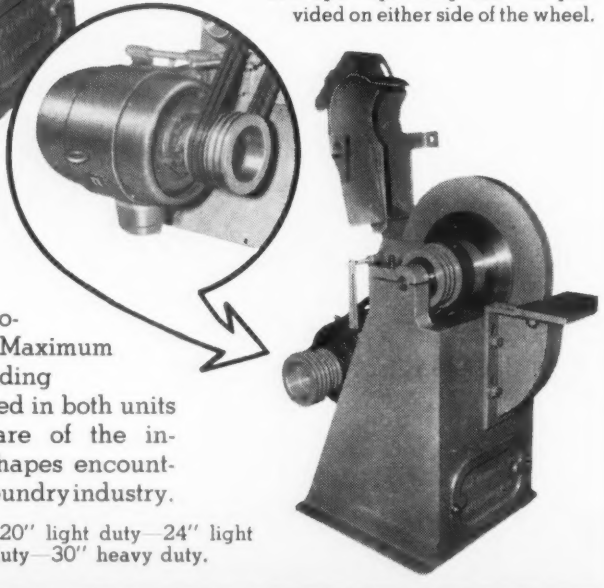

FOX HIGH-SPEED STAND GRINDERS



HIGH-SPEED PRODUCTION FOR THE FOUNDRY

Three important reasons why FOX Grinders are designed as single-wheel machines:

1. Speed changes can be made at the proper wheel diameter.
2. Less space is required for each installation.
3. Proper operating room is provided on either side of the wheel.



These Stand Grinders have been designed for use in foundries where high-speed production is required. Maximum clearance at the grinding face has been provided in both units to properly take care of the innumerable casting shapes encountered throughout the foundry industry.

Comes in 4 sizes: 20" light duty—24" light duty—24" heavy duty—30" heavy duty.

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.


## C. O. Bartlett & Snow Co. Purchases Grindle Corp.

C. O. Bartlett & Snow Co., Cleveland, has purchased the assets of Grindle Corp., Harvey, Ill., and will operate it as a division of its Foundry Equipment Department. Grindle Foundry Division will continue its regular activities at its present address, 15405 Park Ave., Harvey, until suitable facilities can be provided by Bartlett & Snow at its Cleveland headquarters. Grindle will operate under its present management, with Judson H. Gougler as chief engineer and John Donaldson as manager.

Acquisition of Grindle will permit Bartlett & Snow to offer an enlarged line of foundry equipment in addition to its own sand, mold and casting handling units. Grindle products include equipment to handle metal and other foundry products; cupolas and metal melting furnaces, with hot blast; and equipment for dust, gas and fume control.

Both Grindle and Bartlett & Snow will be represented by exhibits at the AFS Exhibit in Atlantic City, May 3-9.

## Forms Consulting Firm for Air Pollution Problems

A firm for general consultation on all aspects of air pollution has been organized by Wesley C. L. Hemeon, former engineering director of Industrial Hygiene Foundation and senior fellow of Mellon Institute. The new firm is known as Hemeon Associates, and headquarters offices and laboratory are in the Loeffler Building, 121 Meyran Ave., Pittsburgh.

George F. Haines Jr., also a former fellow of Mellon Institute, heads a staff of specialists in various aspects of air pollution in the capacity of chief engineer. Mr. Haines has been associated with Mr. Hemeon for the last ten years in various researches on dust control, air pollution and industrial hygiene. The staff will be supplemented by a team of consulting associates which will embrace completely the several fields of chemistry.

# Take an *Inside* Look at ABC FOUNDRY COKE

If you could look *inside* a lump of ABC foundry coke, you would see why leading foundries in more than 30 States find it unexcelled for efficient cupola results.

You would see coke qualities found in few, if any, other brands — but essential to discriminating melters.

You would see that ABC foundry coke is a scientific blend of the very finest quality, carefully selected and specially prepared washed Alabama coking coals and low volatile Pocahontas West Virginia Coal — *a combination that has never been surpassed.*

You would see that the structure of ABC foundry coke is dense, firm and tough, but not brittle, assuring the desired degree of combustibility and minimum breakage in handling.

You would see how control of analyses within narrow limits, improved mechanical equipment and rigid supervision have produced a coke exceptionally uniform in quality and the proper size for efficient melting results and close carbon control.

If you're not already using ABC foundry coke in your operations, give it a trial and see how ABC will improve your cupola performance and reduce your melting costs.

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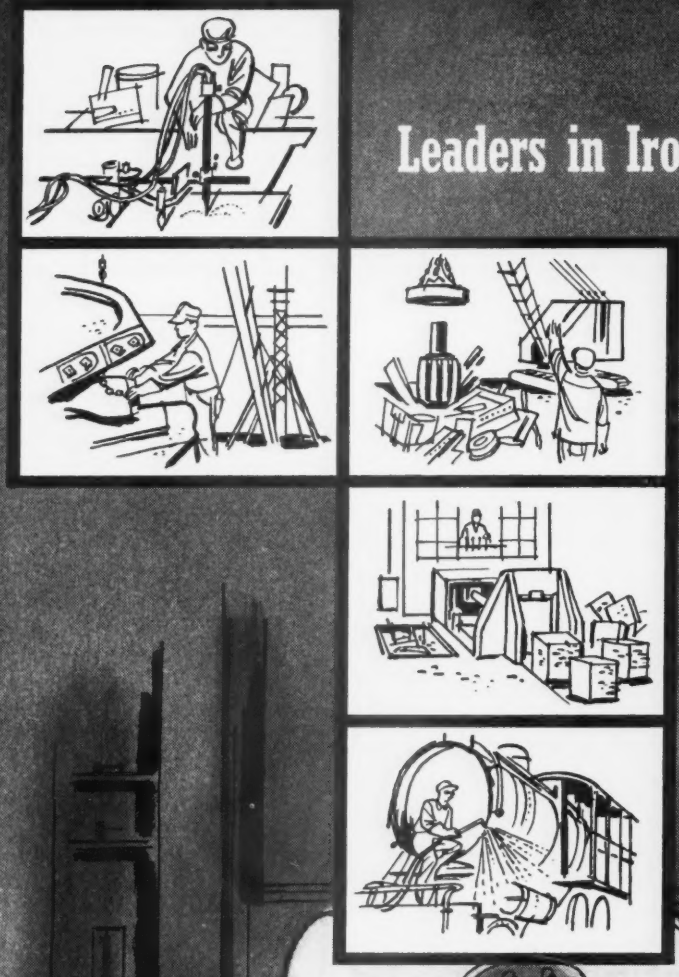

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IMPORT & EXPORT — **LIVINGSTON & SOUTHARD, INC.,** 99 Park Ave., New York, N. Y. *Cable address:* **FORENTRACO**

# Here's How You Can Take a Fast Physical Inventory

## *Even Large Plants Can Do the Job in One Day*

By George J. Bevans*

HOWEVER efficient a plant's accounting system may be, the company's book inventory records must be reconciled with an annual physical check of materials actually on hand. Two different methods for taking this physical inventory are widely used. One is to cover all storage areas in the course of a year by checking the stock on a different section of floor each successive week. The other is to do the whole job at one time.

The advantage of the second method is that it gives an accurate picture of the over-all situation so that all records can be reconciled simultaneously. The traditional objection to taking physical inventory of the whole plant at one time is that it interferes with production for several days while the job is being done or stops it totally.

**Do the Job in One Day**—But now a method for taking inventory in a large plant in a single day has been perfected by Gene H. Kline, a top accounting executive with General Foods Corp., in whose plants this method is being used successfully. This system was developed over a period of years for a number of large and small companies in the automotive, aircraft, electrical appliance and farm equipment industries. There is no reason why it cannot be used in *any* industry.

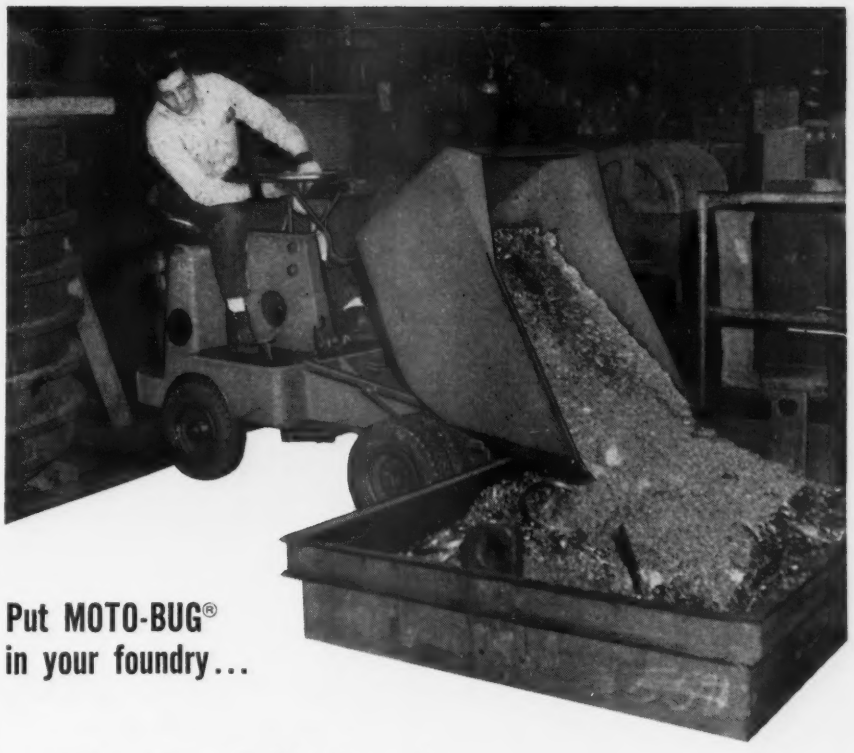
**How the System Works**—The complete procedure embraces only 12 simple steps:

1. Draw an easily understood diagram of each floor area in the plant to be inventoried. Have sufficient copies made so that each of the two counting teams you will appoint for every area, will have a copy, at least for that section of floor for which they are responsible; so that each supervisory team will have a copy; and so that there will be a surplus in case some copies become mislaid.

2. Divide the manpower available for the actual counting into two-man teams, and draw up an assignment sheet showing the areas each team is to count. Provide for having each area counted twice by *different* teams. This step makes for accuracy.

3. List all classes of items to be counted in each area, indicating how each class is to be recorded—that is,

*Management Engineer, Systems Council, New York.

**Put MOTO-BUG® in your foundry...**

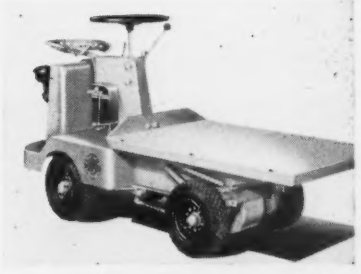
**haul 1-TON loads with 1-man economy**

You can earn substantial savings in time and labor with one of these Kwik-Mix Moto-Bugs in your foundry. Big 4-wheel model shown above carries up to 2000 pounds, or 15 cu. ft.* of bulk materials each load . . . hauls sand, scrap, slag, coke, small castings or any other materials you shovel, stack or load in the gravity-dump hopper.

85% of loaded weight on front drive wheels, and 8.3 h.p. gas engine, provide plenty of tractive power to climb 16% grades, carrying maximum 1-ton load. Moto-Bug also can be used as a small tractor. Fully loaded, it gives you 550-lbs. drawbar pull for towing wagons or carts.

Moto-Bug travels 6 m.p.h. forward or reverse, has automatic brakes. Clutch lever and brake pedal are within easy reach of seated operator. There's 24-to-1 gear reduction ratio on steering wheel. Turning radius is only 73 inches . . . overall width, 35 inches. Get complete details on this latest model Moto-Bug from your Kwik-Mix distributor . . . or write to us.

*18 cu. ft. hopper optional



Change hopper body to 4½-foot platform, and you have a 1-ton truck. Moto-Bug also converts to a ¾-ton (7 foot) fork lift.

Also check smaller, 6 h.p. Moto-Bug, 3-wheel type. Has 10 cu. ft. hopper . . . interchangeable ¾-ton platform, and the ½-ton capacity fork lift attachment.

mail to: KWIK-MIX Co., Port Washington, Wisconsin (Koehring Subsidiary)

Send us literature on: ☐ 1-ton, 8.3 h.p. Moto-Bug ☐ ¾-ton, 6 h.p. Moto-Bug

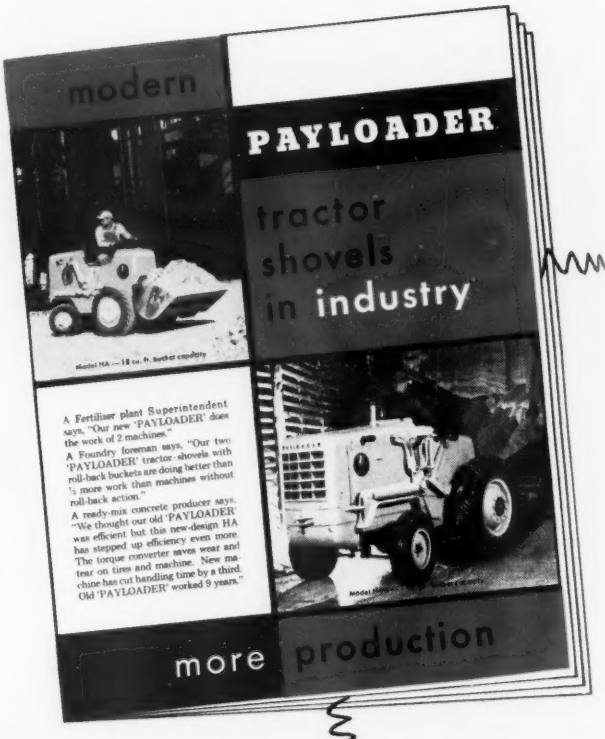
NAME ..... TITLE .....

COMPANY ..... DIV. .....

STREET .....

CITY ..... STATE ..... KM449 REV FO

# get these first-hand reports of profitable bulk-material handling methods


modern
PAYLOADER
tractor shovels in industry
A Fertilizer plant Superintendent says, "Our new 'PAYLOADER' does the work of 2 machines."
A Foundry foreman says, "Our two 'PAYLOADER' tractor-shovels with roll-back buckets are doing better than ⅓ more work than machines without roll-back action."
A ready-mix concrete producer says, "We thought our old 'PAYLOADER' was efficient but this new-design HA has stepped up efficiency even more. The torque converter saves wear and tear on tires and machine. New machine has cut handling time by a third. Old 'PAYLOADER' worked 9 years."
more production

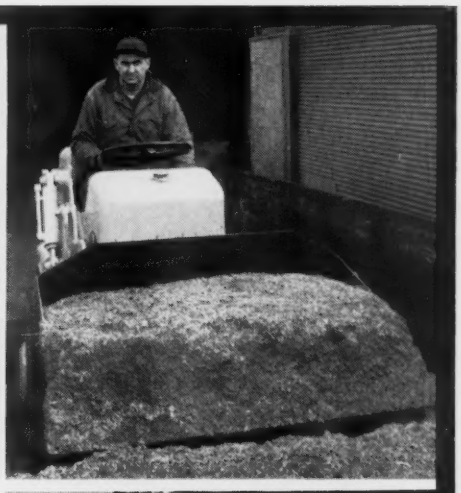
***Roll-back bucket action does 1/3 more work at OHIO STOVE CO.***

Before buying these two model HA "PAYLOADER" units for its foundry, Ohio Stove Company tried other equivalent-size loaders. In their own words, "the 'PAYLOADER' came way out on top. The two new design HA's with roll-back buckets are doing better than ⅓ more work than machines without roll-back action."

Ohio uses these machines to handle hundreds of tons of sand and castings daily—to scoop up sand and castings from all over the pouring floor, delivering the mixture to the shake-out in ton loads . . . also use them to deliver sand to molder's stations.

## *Versatility pays off at MUELLER BRASS CO.*

The usefulness of a "PAYLOADER" is only limited by the imagination of its owners. Designed primarily for fast handling of bulk or loose materials, it nevertheless is a jack of all jobs in many plants. Mueller Brass Co. uses its model HA's to unload trucks and car loads of brass and copper scrap and turnings—to handle drums and baled material—to remove snow . . . in fact, for all sorts of odd but important jobs in addition to the regular sand handling duties in its foundry.



More than 35 years of experience in tractor-shovel design and application has been built into "PAYLOADER" units by The Frank G. Hough Co., originators of the unit-design tractor-shovel. It is this vast experience and knowledge incorporated into the design of each "PAYLOADER" model that makes the big difference in its superior performance on any job.

The new "PAYLOADER" Models HA and HAH include many exclusive features which pay off in greater output per hour. They are small and compact for easy maneuvering and handling in close quarters, yet have ample dumping height for most any job. The 40° bucket roll-back gets full loads fast and, combined with the hydraulic shock absorber, enables the "PAYLOADER" to carry full loads in a higher gear without spillage. These two features are BIG reasons why these machines give more production than heavier machines with bigger engines.

The full-reversing transmission and torque converter provide a wide range of easily obtainable speeds and maximum efficiency in handling each load. Extremely rugged construction . . . finest quality in each component—assures continuous performance with a minimum of "down-time" and a longer useful life.

**PAYLOADER®**

MANUFACTURED BY
**THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.**
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

It's the difference in performance that has made the "PAYLOADER" the decided choice in thousands of plants throughout the world —there are more in service today than all other makes combined. A "PAYLOADER" is your best investment now — and for the future.

**THE FRANK G. HOUGH CO.**
703 Sunnyside Ave., Libertyville, Ill.

- ☐ Send profitable bulk-handling reports
- ☐ Literature on model HA (1⅛ cu. ft.) and model HAH (1 cu. yd.) "PAYLOADER"
- ☐ Literature on larger units to 2¼ cu. yd.

Name_____
Title_____
Company_____
Street_____
City_____
State_____

DON'T BUY
OUTDATED
PERFORMANCE . . .
order Chicago
Airfoil Bladed Fans
Aerodynamically shaped blades cut H.P. up to 35% and move more air with 65% less noise. Fans rated 600 to 1 million cfm.
Write for Bulletin A-102 F
CHICAGO
BLOWER CORP.
9861 Pacific Ave., Franklin Park, Ill.
See Phone Directory for Sales Offices


whether in pounds, barrels, dozens, gallons, etc.

4. Select a two-man team to supervise the counting in each area or group of areas. Usually each supervisory team should consist of the foreman who supervises that section of the plant and an accountant to work with him.

5. Have an established manufacturer of patched system tags supply you with a quantity of them sufficient for recording on a separate tag the quantity of each different class of material stored in each separate area to be inventoried. A model for this tag is reproduced here. These

INVENTORY COUNT TAG

NO. 4838

SECOND COUNT

LOCATION NO. 4838

QUANTITY

UNIT OF COUNT

COUNTED BY

FIRST COUNT

LOCATION NO. 4838

ARTICLE

DESCRIPTION

QUANTITY

UNIT OF COUNT

COUNTED BY

DATE

Model of inventory count tag

tags should be prenumbered in sequence. Only an established tag manufacturer has the facilities for producing such tags at the most economical price.

6. Give to each supervisory team a quantity of tags sufficient for the counting teams assigned to the areas under the supervisory team's direction. Record tag assignments by numbers on an inventory tag control schedule. Explain to all concerned that every tag issued must be strictly accounted for.

7. Prepare and issue lists of counting instructions for the guidance of each supervisory team and all counting teams.

8. Hold a meeting with all supervisory teams. With them, go over your typed or mimeographed counting instructions word for word and clear up any questions.

9. See that the supervisory teams hold a similar meeting with the ac-

Step ahead in this five billion dollar market with

Foundry's

PLUS 5 SERVICE

What is PLUS 5? It's your key to more business from foundries. It gives every FOUNDRY advertiser a bonus he can get from no other source. Here is help in analyzing this market—studying sales territories and potentials—planning the sales effort—and creating a constructive promotion program to the 5 billion dollar foundry market. It's time to take a new look at this market—and at the unusual selling aids we have for you. Say PLUS 5 to your FOUNDRY representative and he'll show you this 5-step program designed to move more of your products into foundries.

A Penton Publication

FOUNDRY

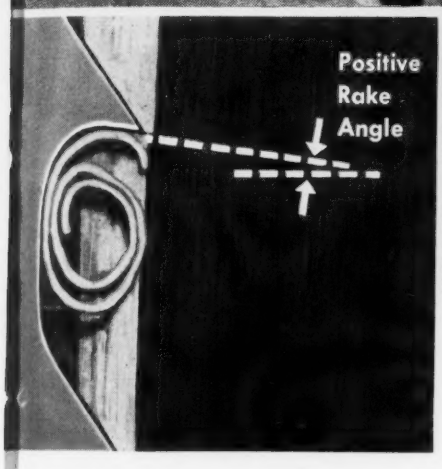
more than a magazine . . . a complete sales development service

Penton Building, Cleveland 13, Ohio

# "No blade can stand up to DoALL'S CLAW-TOOTH on Aluminum Castings"

"We get 1/3 again as much life and faster cutting with Claw-Tooth than with any other type saw band."

...says Sunset Foundry, Seattle, Washington




## User Tried Them All, Then Settled On Claw-Tooth Saw Bands

Sunset Foundry ran comparison tests of all types of saw bands cutting gates, risers and flash from castings. DoALL Claw-Tooth won by providing 1/3 longer life and faster cutting. A 5" dia. aluminum alloy #122 riser, above, is removed in 45 seconds with Claw-Tooth . . . other blades took minutes.

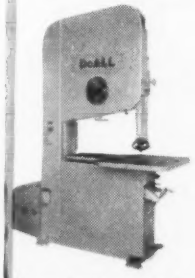
For foundry sawing Claw-Tooth can't be beat. Hardened positive rake angle teeth pull themselves into the work. The saw band cuts faster with less feed pressure resulting in more output per operator with less fatigue.

See this amazing saw band in action, in your plant, at DoALL's expense. Call your local DoALL Sales-Service Store or write:

### Why Claw-Tooth Cuts Faster...

Claw-like Teeth, having a positive penetrating angle are designed to pull themselves into the work. As a result, Claw-Tooth cuts faster than other blades, with less feed pressure and less operator fatigue.

DoALL



**The Zephyr Band Machine** ... to secure the utmost in foundry sawing. Variable speed ranges up to 15,000 fpm. for standard or friction sawing. 36" throat depth, 20" work height. Write for free bulletin.

All saw bands stocked locally in 38 friendly DoALL Sales-Service Stores. Call yours today.

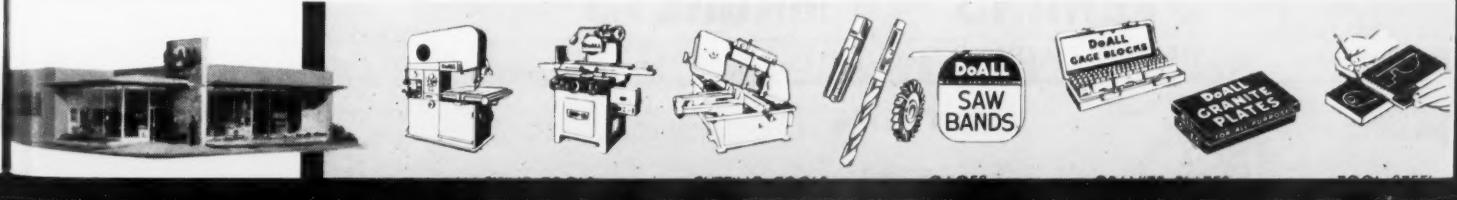
**THE DoALL COMPANY, Des Plaines, Illinois**

Seven standard widths, ¼" to 1½", and four pitches, 2 to 6, available in: Welded lengths to fit any band machine and 100' and 500' coils in exclusive "strip-out" boxes.

*Ask for new 16 page free saw band selection catalog—details best type of saw band for type of work and available sizes, pitches, and widths. Write today!*

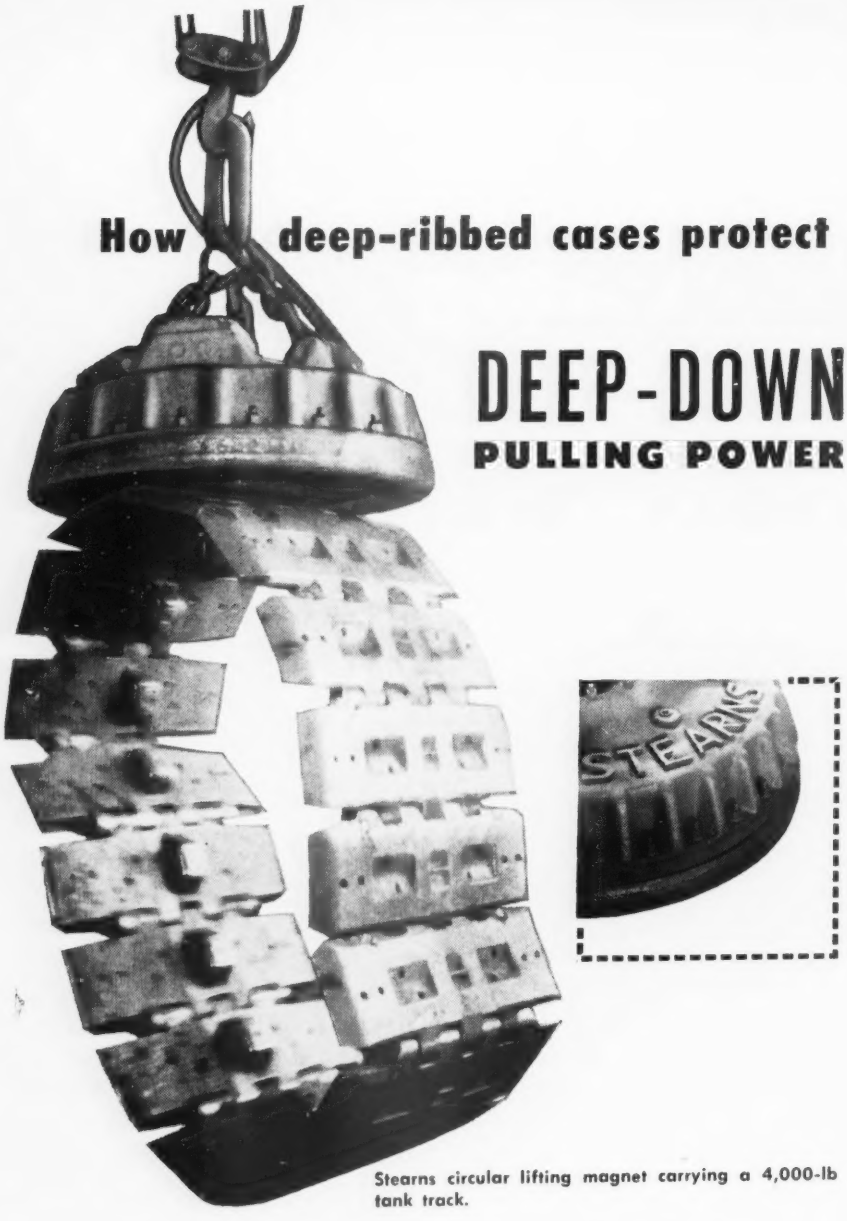
DoALL, Claw-Tooth, and Zephyr are registered trademarks of The DoALL Company, Des Plaines, Ill.

SB-45



## How deep-ribbed cases protect

# DEEP-DOWN
## PULLING POWER




Stearns circular lifting magnet carrying a 4,000-lb tank track.

The cooler the magnet, the better its lifting efficiency. That's why powerful, deep-field Stearns lifting magnets are designed for maximum heat dissipation. In both the welded and bolted units, the heavily ribbed magnet case provides greater radiation area, for cooler and more efficient operation.

This design also provides greater protection against internal and external damage in the event of rough handling. These are important reasons why you can operate Stearns magnets profitably on steady, long-shift duty.

In addition to fast heat dissipation, Stearns magnets offer the following advantages:

- Permanently sealed magnet coil not disturbed when servicing terminals or pole shoes.
- Leads and terminals fully protected against abrasion and shock.
- Vacuum-impregnated windings assure long life, and dependable operation.
- Waterproof construction.

Stearns lifting magnets — both circular and rectangular are available in a wide range of standard sizes. Custom-built models on request. See your Stearns representative or write for Bulletin 35-B-2.

1093

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

**STEARNS MAGNETS**

STEARNS MAGNETIC, INC., 662 S. 28th St., Milwaukee 46, Wis.


counting teams under their respective direction.

10. As early as possible on the day selected, start the actual count. If tags assigned to a supervisory team for distribution to its counting teams prove insufficient, do not allow the team to borrow any tags from other teams. Insist that they obtain any additional tags needed from a central control so that the tag numbers may be properly recorded on the inventory tag control schedule.

11. As the first counting team counts an area, it should attach a tag to each pile or bin counted, fill out the lower section of this tag, tear off this stub and hand it in to the supervisory team for the area. The second counting team records its inventory figure on the second section of the tag, tears this stub off and turns it in to the supervisory team. The supervisory team should require that the numbers on the tag stubs turned in by the second team match exactly the numbers on the tag stubs turned in by the first team.

12. The accountant on the supervisory team should check the inventory figure on each tag stub turned in by the second team against the figure on the corresponding stub turned in by the first team, and he should reconcile any variations. No erasures should be made. Any figures the accountant decides should not be used merely should have a line drawn through them. The accountant also may classify, by a symbol on the tag recording the first count, the nature of the material counted—that is, whether it is raw material, material in process or finished goods. All adjustments in figures should be made on the tag stubs used for the first count. Thus only these stubs need be considered in the final tabulation made by the counting department, to which these stubs should finally be routed from the control center.

**Advantages**—The advantages of this simple system for taking physical inventory are that it yields records which are highly accurate, fixes responsibility for any errors and makes the actual counting work relatively easy for the participants. Thus employment of this simple system eliminates most of the headaches usually incident to the laborious task of taking physical inventory in manufacturing plants.

## Appoints New Distributor

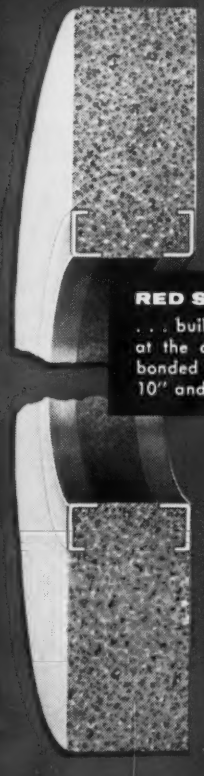
Kwik-Mix Co., Port Washington, Wis., has appointed Twin City Equipment Co., New Philadelphia, O., as a distributor of its powered wheelbarrows. The new agent will serve Tuscarawas, Carroll, Coshocton, Stark and Harrison counties.

# SIMONDS ABRASIVE CO.

# GRINDING WHEELS... with *improved bushings* for better grinding

**TRUFIT**
. . . a resin-impregnated fiber sleeve in the center hole, principally for resinoid bonded wheels for portable grinders.

**POLYSTYRENE**
. . . injection molded plastic material replacing conventional lead bushing, chiefly for tool room wheels such as 7 x ½ x 1¼.



**RED STREAK FLANGES**
. . . built-in circular steel flanges at the center hole. For resinoid bonded snagging wheels with 6", 10" and 12" hole sizes.

**STEEL INSERTS**
. . . threaded or plain, in sizes to fit all portable grinders, including straight wheels, cup wheels and cones.

**KARVIT**
. . . a hard, non-metallic material with a smooth surface, replaces lead or plain holes, principally for precision grinding wheels.

Better, more economical grinding! Simonds literally "centers" on this with these improved bushings. For you, this means better grinding efficiency . . . in terms of better spindle fit, better balance, truer running, less wear on spindles and center mounts and better work produced.

*Put all these advantages to work for you by specifying Simonds Abrasive Co. Wheels on all your grinding jobs.*

**SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.**

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco. Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass.

# Foundry Developments

By EDWIN BREMER
*Metallurgical Editor*

RECENTLY in discussing research, Dr. Eugene Wainer, vice president and director of research, Horizons Inc., Cleveland, pointed out that one of the most important fields of work in the foundry is that of sands and binders. Binders that are gas-free or relatively gas-free are important to prevent gas inclusions, blowholes and porosity in castings. "This may sound completely contrary to normal expectation of expansion when heated and contraction when cooled, but we actually are working on a casting sand that would contract when heated and expand when cooled," he said. "Obviously, the advantage is that upon contraction on heating the sand would make a tougher mold and would prevent crumbling. By the same token, its expansion on cooling would make for easier cleaning and reduce the shakeout problem after casting."

## Has Wear Resistance

ZINC-BASE alloy for making drawing dies, as described in U. S. Patent No. 2,728,657, is claimed to have a high degree of wear resistance. It is composed of 0.5 to 4.0 per cent Cu, 2.0 to 4.5 per cent Al, 0.2 to 1.2 per cent Si, 1.0 to 1.2 per cent Mn, 0.05 to 0.25 per cent Mg and remainder Zn. The alloy is made by heating the Zn to 825 to 875° F, adding a copper-manganese alloy at a temperature of 1750 to 2000° F, followed by addition of an aluminum-silicon alloy heated to 1300 to 1500° F, and then by addition of Mg. The zinc-base alloy then is poured at a temperature about 10 to 15° above its melting point.

## Saves Machining Time

MANY corrosion- and heat-resistant alloys are currently being investment-cast to produce valve parts subjected to severe service conditions, according to Haynes Stellite Division, Union Carbide & Carbon Corp., Kokomo, Ind. The method is said to produce parts with sound, dense structures and close dimensional tolerances. Because the alloys involved usually have low machinability ratings, the reduction in amount of finishing stock required and the close tolerances are claimed to reduce machining time up to 50 per cent.

## Making Chills

IN A recent discussion of the $CO_2$ process in Great Britain, it was suggested that if powdered silicon carbide instead of silica sand is employed, excellent contoured chills can be made easily and rapidly.

## Stops Brake Fading

DOUBLE-DISK automotive brake made by Auto Specialties Co., St. Joseph, Mich., consists of four die-cast aluminum disks. Two outer disks are faced with cast-in gray iron plates. Brake lining is bonded to the two inner or actuating disks, which are separated by seven steel balls, each seated in a conical bearing ramp. In operation hydraulic pressure rotates the inner disks apart, allowing the steel balls to slide up their ramps, pressing the lined disks against the iron-faced outer disks smoothly and steadily with a wedging action. This sliding pressure, in combination with the high thermal conductivity of aluminum, is claimed to eliminate "brake fading."

## Withstands Abrasion

PLASTIC materials especially developed to resist wear and abrasion withstand rigorous use, and are being used to repair worn areas on metal production patterns employed under sandslingers, according to Marblette Corp., Long Island City, N. Y.

INFRARED HEATING: Huron Mfg. Co., Huron, O., now is in operation in a 6400-sq-ft, all-steel building. Formerly known as Master Pattern Co., Cleveland, the firm has operated a permanent mold and pattern shop for 25 years. The structure is heated by 26 infrared units controlled by four thermostats which maintain an even and constant temperature with no drafts. Rays from the units heat only the objects which they touch.

**MORGAN ENGINEERING CO.,** Alliance, Ohio, uses Timken bearings on the idler and driver track wheels of their 50/20-ton capacity overhead traveling cranes to take heavy thrust loads, reduce friction, keep performance up and maintenance down.

# Morgan Cranes move hot slabs fast

## ...TIMKEN® bearings cut traveling costs

THESE Morgan heavy-duty cranes move hot steel slabs from cars to storage in an Eastern steel mill and do it fast. To be sure they keep rolling and at minimum cost, Morgan engineers mounted the idler and driver track wheels on Timken® tapered roller bearings. They keep them on the go with minimum maintenance.

The tapered construction of Timken bearings lets them take *both* radial and thrust loads in any combination. And full line contact between the rollers and races gives Timken bearings *extra* load-carrying capacity. They can take the heavy thrust loads of crane operation in stride. No additional thrust devices are needed. Longer bearing life is assured. Cranes keep rolling.

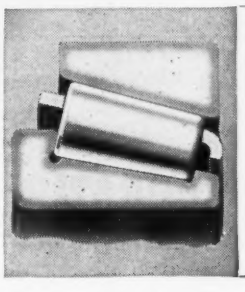
Timken bearings practically eliminate friction because they are designed by geometrical law to have true rolling motion and are made microscopically accurate to conform to their design. Because friction is reduced wheels and loads roll smoothly. Costly maintenance drops, power is saved.

And by holding housings and shafts concentric, Timken bearings make closures more effective. Dirt and dust stay out; lubricant stays in. Lubricant and upkeep costs are also decreased.

What's more, to be sure of toughest, finest bearing steel, we make our own. We're America's only bearing manufacturer that does.

Only Timken bearings give you so many advantages. Always specify Timken bearings for the machines you buy or build. Be sure the trademark "Timken" is on every bearing —it's your assurance of full, money-saving value. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

*This symbol on a product means its bearings are the best.*



**GREATER LOAD AREA**

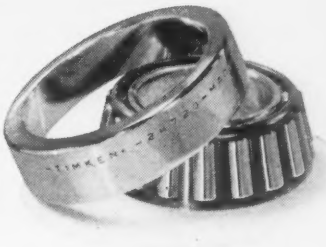
Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

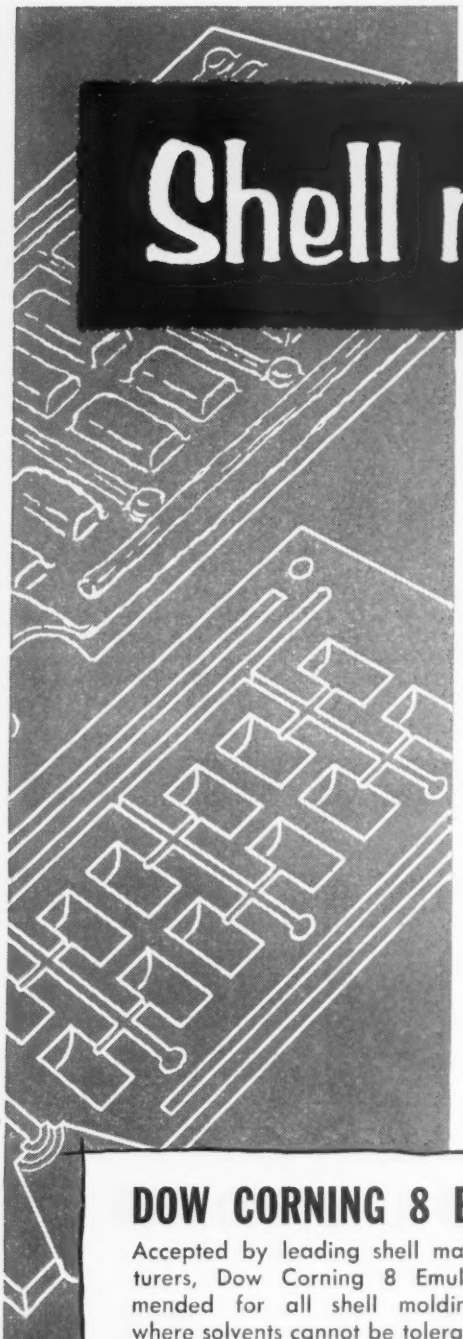
**TIMKEN**

TRADE-MARK REG. U.S. PAT. OFF.

**TAPERED ROLLER BEARINGS**



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ▯ AND THRUST ▯— LOADS OR ANY COMBINATION —✳



# Shell molders...

## for fast, positive release more continuous production cleaner patterns, lower costs

*use Dow Corning Silicone release agents*

Shell molding is easier, more accurate and more economical when you use a Dow Corning SILICONE release agent. Especially developed for the metal casting industries, these silicone parting agents give you clean, easy release every time with little or no build-up on even the most complex patterns. Cleaning costs are minimized, and you obtain increased production of shells with uniform dimensional accuracy.

### DOW CORNING 8 EMULSION

Accepted by leading shell machine manufacturers, Dow Corning 8 Emulsion is recommended for all shell molding applications where solvents cannot be tolerated. It is easily diluted in hard or soft water, resists creaming or separation—both after dilution and in storage, and is noncorrosive and nonflammable.

### DOW CORNING 452 FLUID

A single application of this new solvent type silicone parting agent provides easy release for several resin-sand shells. Easily applied to either hot or cold patterns, Dow Corning 452 rapidly wets the surface and leaves a uniform silicone film that is both heat stable and oxidation resistant.

**make your own test**
mail coupon today for
**free sample**

Dow Corning Corporation, Dept. 5905, Midland, Michigan

Please send me:

- ☐ Free sample of Dow Corning 8 Emulsion
- ☐ Free sample of Dow Corning 452 Fluid
- ☐ Free sample of Dow Corning 7 Compound
- ☐ Data on silicone release agents for the shell process.

NAME _____

COMPANY _____

ADDRESS _____

**EXTRA** for truly effective and lasting pattern break-in use convenient, ready-to-use ***Dow Corning 7 Compound.***

**DOW CORNING CORPORATION**
MIDLAND MICHIGAN
DOW CORNING SILICONES

ATLANTA CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D. C. (Silver Spring, Md.)

Canada: Dow Corning Silicones Ltd., Toronto — Great Britain: Midland Silicones Ltd., London — France: St. Gobain, Paris

# Partial Vacuum Test Gages Gas Content in Aluminum

## *No Gas Escapes Sample During Solidification*

By W. M. Halliday*

FOR a long time, foundrymen have needed a quick, accurate, reliable test for determining the occluded gas content of molten aluminum. Such a test is especially important when castings must be produced with precision control of mechanical strength, rigidity of wall structure, homogeneity, freedom from porosity, etc.

Foundries have used a number of methods to determine gas content, but none has been completely satisfactory. A quick, useful one is the Pfeiffer gas test, in which a specified charge of aluminum is solidified under a high vacuum. Although this test is fast and economical, even it is not completely reliable. Now, the British Non-Ferrous Metals Research Association has developed a partial-vacuum test which provides a more reliable method of establishing gas content quantitatively.

**The Partial Vacuum Test**—The principle on which it is based is similar to that of the Pfeiffer test. A selected small volume of molten alloy is allowed to solidify in a vacuum chamber, but only a partial vacuum, of 45-mm Hg, is employed.

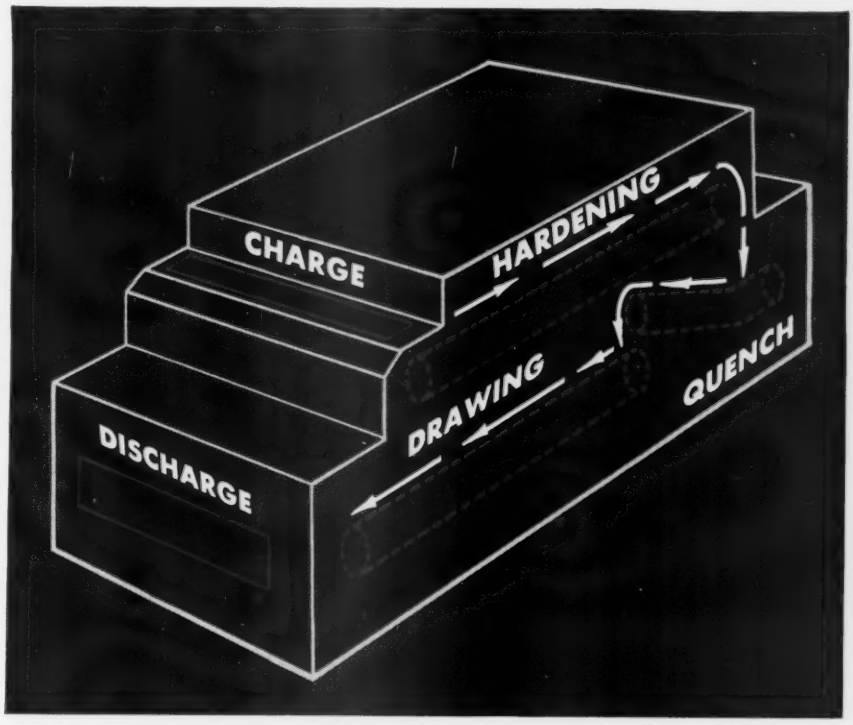
The practical effect derived by exposing the sample alloy to such a partial vacuum is important. Because no gas is evolved from the melt in the vacuum, the user does not have to check bubble escape-bursts on the surface of the sample while it is in the vacuum chamber. All gas remains entrapped in the solidified charge and forms large, extensively distributed cavities in its interior.

The solid sample is removed from the vacuum system to be sawed into suitable sections, as in the Pfeiffer test, and the density of the various pieces then is assessed as an index to the gas content of the molten charge, which is representative of the melt. From these cavities, which can be measured, it is comparatively easy to determine the volume of gas which has been occluded. Thus, one of the chief objections to the Pfeiffer test—the need to count escaping bubbles—is avoided entirely.

**How the Test Works**—Carrying out this adapted and improved gas-content test requires the following

*Consultant, Southport, England.


BLAZING THE HEAT TREAT TRAIL WITH HOLCROFT




LET'S TALK ABOUT
DOUBLE DECK FURNACES

Ever try to fit two entirely different furnaces into floor space where only one will go? It can be done. All you do is *stack one on top of the other!*

Holcroft did it first a good many years ago. The furnace illustrated—by no means the first of its type—was built for a Detroit automobile plant back in 1932.

Three thousand pounds of connecting rods and spindles each hour were treated—moving first through a hardening furnace on the upper deck and then down a chute into a quench tank. Work was elevated by means of a reverse conveyor from the tank and loaded onto the return conveyor belt of the lower furnace for drawing and discharge.

Furnaces like these can be fully automated, or have manual transfers. They can be designed to heat treat a specific part, or to be used for general production.

This is the kind of heat treat background and creative engineering that is available to you when you come to Holcroft. It's a good idea to do it—*today!*

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6545 EPWORTH BOULEVARD • DETROIT 10, MICHIGAN
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE
CHICAGO, ILL. • CLEVELAND, OHIO • DARIEN, CONN. • HOUSTON, TEXAS • LOS ANGELES, CALIF. • PHILADELPHIA, PA.
CANADA: Walker Metal Products, Ltd., Windsor, Ontario

FOUNDRY
1560 cores an hour
If you read this interesting article by Mr. Herrmann in FOUNDRY (Feb. 1956) you were reading about a remarkable.
Big Oven Can Bake . . .
1560 Cores an Hour
ROSS OVEN
...one of the largest in the world!

**The ROSS horizontal core baking oven at the Chevrolet-Saginaw Grey Iron Foundry, Saginaw, Mich. measures 280 ft. in length. With its conveyor speed of 95' per minute, this ROSS oven is capable of baking 1,560 six-cylinder barrel cores per hour—a remarkable production achievement. Recirculating heating equipment is gas or oil fired and cooling apparatus is provided.**

**For the most modern in mechanized core baking equipment, we invite you to write for our Bulletin No. 52.**

Inquire about the ROSS Hot Blast Heating System that greatly increases tonnage while saving coke, labor and repairs. Can be installed with no interference with melting schedules.

**J. O. ROSS ENGINEERING CORPORATION**

***Main Office:* 444 MADISON AVE., NEW YORK 22, N. Y.**

**Atlanta • Boston • Chicago • Detroit • Los Angeles • Seattle**

ROSS ENGINEERING OF CANADA, LIMITED, MONTREAL, CANADA


apparatus and procedure:

The sample quantity of molten alloy is placed in a bronze, gastight autoclave which is used in an airtight steel cylinder. Internal capacity of the latter is from 35 to 40 times greater than that of the small autoclave. The two are connected together and to a suitable vacuum-pump, and an ordinary manometer is interposed in a connecting pipe between them.

When the test is made, a carefully measured sample—70 grams—is taken from the molten aluminum being tested. This sample is taken from the melt when the temperature has been brought up to 1292°F, and it immediately is placed in a preheated, refractory-lined steel crucible heated to approximately the same temperature. The loaded crucible then is placed in the autoclave, which is sealed with a thick sheet of plate glass, the underside of which previously has been well coated with thick grease or lanolin.

The connection between the autoclave and the gastight cylinder is opened so that the pressure inside the autoclave is reduced to about 45 mm Hg.

### Sample Solidifies from Bottom

The sample charge then cools slowly and solidifies from the bottom upward because it is in close contact with the heavy, cold base of the autoclave. Such contact reduces shrinkage to a minimum. When the sample charge has cooled and solidified, it is removed and sawed into suitable sectional pieces and examined for gas cavities and general porosity defects.

Since practically no gas escapes from the sample during its subjection to the partial vacuum, the cavitation in the sections represents very closely the volume of gas originally present and is representative of the gas content of the entire melt.

Because the internal capacity of the large steel cylinder is large compared with that of the autoclave itself, any small vacuum leaks occurring in operation may be ignored; they will entail only a minute alteration in the pressure during the solidification of the sample.

It is essential to guard against the autoclave's becoming overheated, as when a number of tests have to be made in quick succession. This condition can be corrected by immersing the hot autoclave in a bath of cold water for a few minutes. Attention to this requirement will effectively prevent undue variations in the cooling rate of sample charges there-

Photograph shows CARBOFRAX® brick, raised to white heat (2460°F) in kiln, being plunged halfway into cold water —without spalling or cracking.

*third in a series . . .*

**THERMAL SHOCK RESISTANCE**

# Unusual Properties of Refractory Materials

**Thermal Shock Resistance** in a refractory enables it to withstand rapid recurring temperature changes without spalling and cracking. Several properties affecting the degree of resistance include: thermal conductivity, ultimate strength, thermal expansion and modulus of elasticity.

A number of refractories developed by Carborundum are noted for having these properties in the ranges that insure high heat shock resistance. They successfully meet the stresses and strains imposed by intermittent firing and by high heat releases in restricted areas. In packaged steam generator service, for example, they are far superior to other lining materials. Similarly, they have produced outstanding results in rapidly-heated quickly-cooled crucible type melting furnaces, in heat treating furnaces, incinerators, still settings, etc.

The current issue of Carborundum's magazine "Refractories" features a comprehensive article on heat shock. It may offer suggestions helpful to you in handling a condition of this nature. Send for your copy today.

**CARBORUNDUM**

Registered Trade Mark

**VALUABLE INFORMATION FOR USERS OF:**

**REFRACTORIES • CASTABLE CEMENTS • POROUS PLATES AND TUBES**

**CATALYST SUPPORTS • OXIDE, BORIDE, NITRIDE AND CARBIDE**

**HIGH-TEMPERATURE MATERIALS • CERAMIC FIBER**

***all in the new magazine "Refractories"***

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**Dept. A56, Refractories Division**
**The Carborundum Company, Perth Amboy, N. J.**

Please send me the forthcoming issue of "Refractories".

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Strictly Merchant

Great productive capacity. Entire production for sale at all times. Strategic location of the five plants. Quality of product. These are but four reasons why *more* MELTRITE is used than any other merchant pig iron.

MELTRITE is made to the required analysis for the particular need. Specifications are met for many different grades.

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*Five favorably located plants in Erie, Toledo, Chicago, Duluth.*

*Serving Industry Since 1883*

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after placed in the autoclave. The latter should be maintained at a fairly constant cool temperature throughout the tests.

This partial-vacuum gas test is entirely free from most of the major objections to the more commonly used Pfeiffer test. Thus much more accurate and reliable results are obtained in gaging the gas content of any melt. If the melt is large, several tests should be carried out at well-spaced intervals.

**Precautions**—It is, of course, essential to take special care that the temperature of the heat is maintained uniformly at around 1292°F. Care similarly must be taken to prevent undue oxidation from taking place on the surface of the molten metal. When samples are taken, the ladle should be dipped deeply into the mass to avoid scooping up oxide films adhering to its surface.

Oxide impurities in the samples are not so serious a matter as with samples employed in the Pfeiffer test, but they may cause misleading results because of the absorption of gas generated in the oxides when the charge is in the vacuum chamber. Such additional gases may dissolve in the alloy and cause more extensive gas cavitation in the sectioned samples.

## Gray Iron Founders' Society Opens 1956 Redesign Contest

Gray Iron Founders' Society 1956 redesign contest is under way. Its purpose is to uncover new applications for gray iron castings. The contest is open to all persons in the entire metalworking industry, and entries may be made jointly by two or more individuals.

Entries should include a discussion of facts leading up to the redesigned part—why gray iron was considered for the new part, how much was saved in labor and/or material costs, how much efficiency was gained, and how the gray iron casting is working out better than the original design. An 8 x 10-in. glossy photograph of the casting should be submitted with the entry. If possible, a photo of the original design before it was converted to gray iron also should be included.

Contest entries should be mailed to the society at National City—East 6th Bldg., Cleveland 14, not later than July 1. First prize is $500, second prize $250 and third $100. Awards will be made at the 28th annual meeting of the society in Hot Springs, Va., Nov. 2.

MILWAUKEE COKE SOLVAY

Highest Quality Foundry Coke

MILWAUKEE SOLVAY is highest quality coke—and has been for over 50 years—because it is made only from carefully selected coal purchased for one reason—to make the *best* foundry coke.

Resistant to shatter and abrasion, high in carbon and low in sulphur and ash, MILWAUKEE SOLVAY is screened to the correct size for your requirements. It is always in dependable supply.

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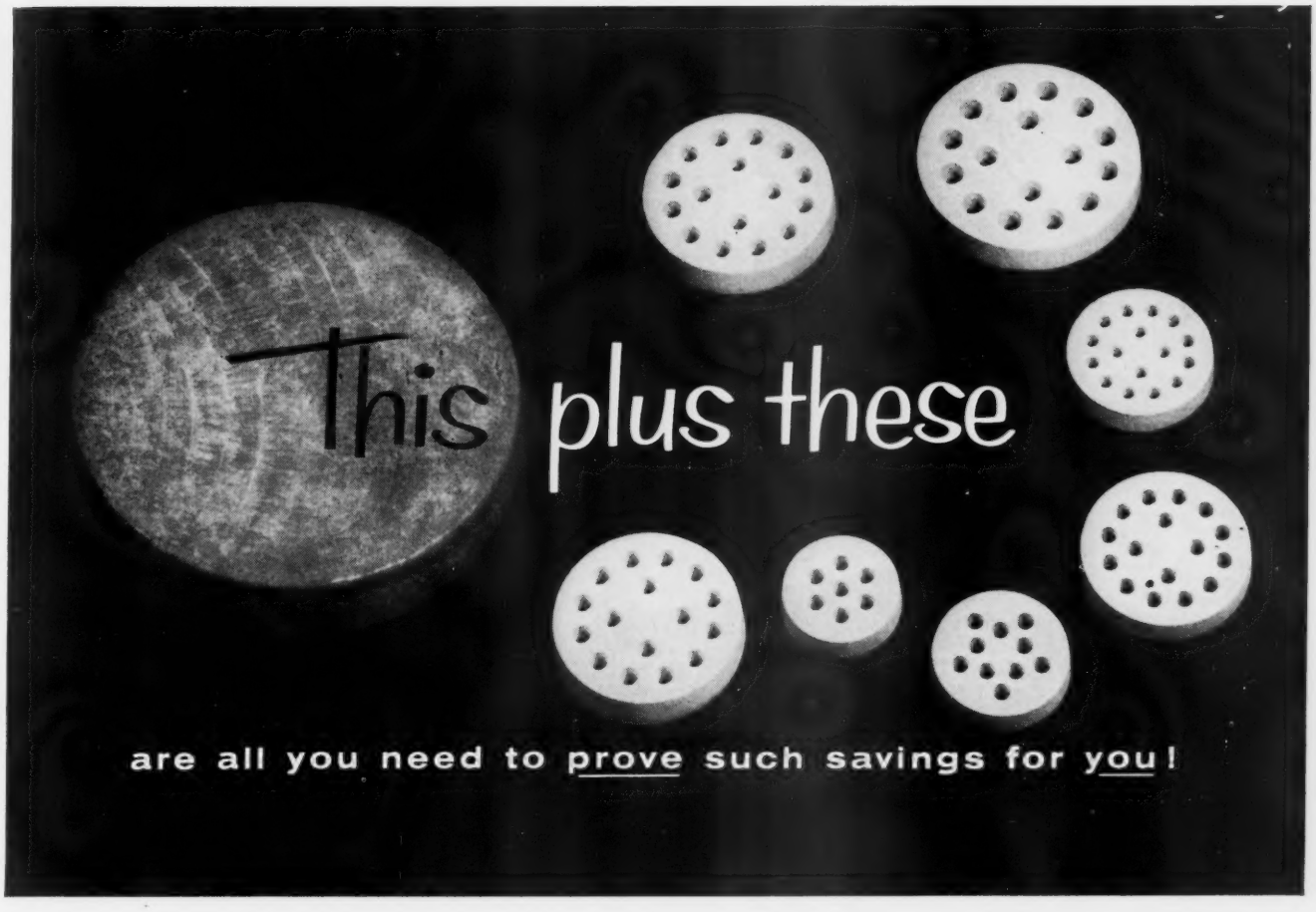
Louthan strainer cores

# CUT SCRAP LOSSES IN HALF!

## save up to 75% in casting "rework" costs!




*Something new has been added* . . . to help you prove through comparative tests that Louthan Refractory Strainer Cores will save you money. If you are still making and using *sand* cores, your savings can be really substantial—through cutting scrap-losses in castings and reducing "rework" costs.

Louthan Refractory Cores keep slag and sand-core inclusions out of castings, and permit closer control of the molten metal. They withstand 3000° F. temperatures without spalling or disintegrating. You'll also find them exceptionally uniform, dimensionally accurate, easy to handle, simple and economical to use.

To help you make comparative tests in *your* plant, under normal production conditions, we now have *core prints* of our standard strainer cores which can be easily attached to your patterns. We'll be happy to *give* you these and a reasonable quantity of the matching strainer cores. Simply tell us your sprue diameter (or in-gate size) and we'll send them to you. Your only obligation is to *try* them and judge the results for yourself!

WRITE FOR
**FREE SAMPLES**
OR LOOK US UP AT
**BOOTH 2011**
ATLANTIC CITY
MAY 3 — 9, 1956

Louthan **REFRACTORY STRAINER CORES**

**Louthan Mfg. Co., East Liverpool, Ohio (Subsidiary of FERRO® Corporation)**

**REPRESENTATIVES:** **M. A. BELL COMPANY,** St. Louis 2, Mo. . . . Houston 3, Texas; **FOUNDRY SUPPLY COMPANY,** Minneapolis 16, Minn.; **MILWAUKEE CHAPLET & SUPPLY CORP.,** Milwaukee 15, Wisc.; **FREDERIC B. STEVENS INC.,** Detroit 16, Mich. . . . Indianapolis 7, Ind. . . . Buffalo, N. Y.

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Since 1939, when the introduction of Malleabrasive revolutionized blast-cleaning, there has been only one MALLEABRASIVE!

MALLEABRASIVE was developed through exhaustive research. Its leadership has been maintained through continuing research and improvement.

- Today there is still only one genuine MALLEABRASIVE.
- MALLEABRASIVE has no exact counterpart—there is no other product exactly like it.
- MALLEABRASIVE is patented because of its own distinctive metallurgical characteristics.
- MALLEABRASIVE is produced only by manufacture under the full and complete MALLEABRASIVE process—used by Globe exclusively.

The qualities that make Malleabrasive distinctively different have made it the most widely used premium abrasive in the world today. In hundreds of plants it has made important reductions in blast-cleaning costs. Undoubtedly it can do the same in yours. At least, why not investigate its possibilities? Write us.

**THE GLOBE STEEL ABRASIVE COMPANY**
**MANSFIELD, OHIO**
*Subsidiary of Pittsburgh Crushed Steel Co., Pittsburgh, Pa.*
*Also sold and recommended by Pangborn Corp., Hagerstown, Md.*

MALLEABRASIVE®


# Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

## "Thoughts on Water"

WATER, like fire, is a wonderful servant but an equally harsh master. Wherever floods have inundated the farms and homes of men, water is indeed a thing to be feared. In many parts of Australia and other arid regions, however, rain is truly a gift from the gods, prayed for as fervently as heavenly salvation.

The story is told of a Death Valley prospector who carried his cooking and drinking water some 4 miles on the back of his mule. When asked if he couldn't get water by sinking a well near his mine, he replied, "Why yes, I could sink and get water."

"How deep would you have to go?"

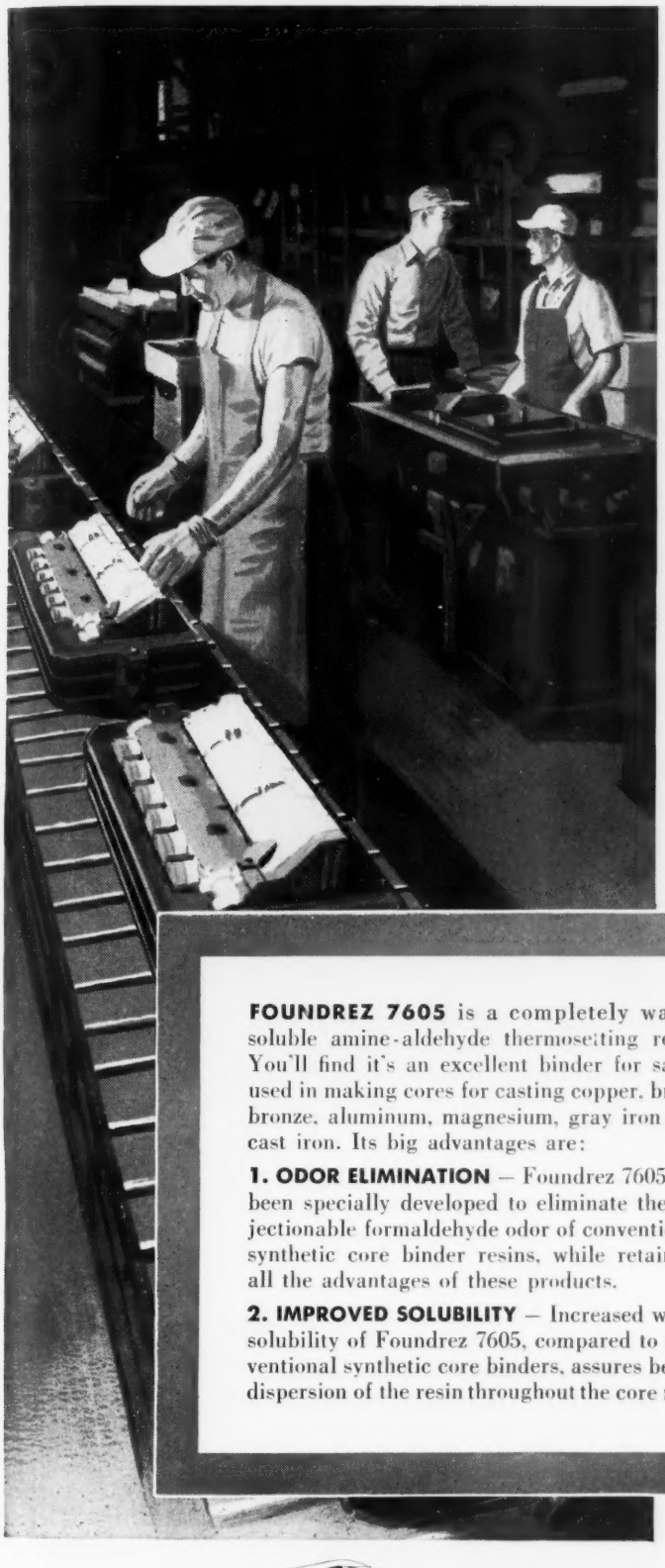
"Well Stranger, I reckon about the same distance I'm toting it now --about 4 miles!"

There also was the wit at the banquet who proposed a toast: "Gentlemen, I drink to water! You couldn't have an ocean, lake or river without it. It enhances the scenery under a bridge. It constitutes some 90 per cent of your entire body. There is nothing better with which to wash your feet. But as a beverage, Gentlemen, it's a damned failure!"

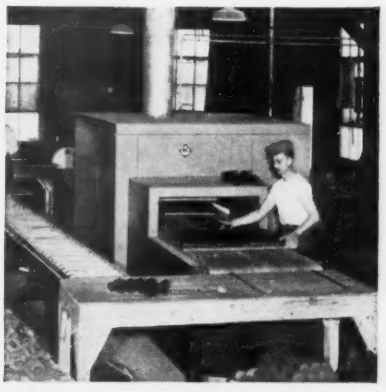
In the form of hydraulic power, water comes the nearest to being 100 per cent efficient, a fact which our drinking friend overlooked entirely. Without $H_2O$, this would be a sad world indeed—even worse than one without sand!

Water has been termed the foundryman's best friend and worst enemy. In sand practice, it is our cheapest bonding agent and the most critical in determining success or failure of the casting process. To a great extent, foundry progress over the past 50 years can be measured in terms of moisture control. Does such a statement sound extravagant? Well, let's see. Let's take a closer look at some of our

*"Foundrez 7605 gives you 4 big advantages"*



**Low operating cost** — Cores made with RCI's Foundrez 7605 resin binder are baked *fast and economically* in this dielectric oven. The cost per ton of labor, materials and fuel is low . . . production rate high.



# RCI offers new odorless core binder

**FOUNDREZ 7605** is a completely water-soluble amine-aldehyde thermosetting resin. You'll find it's an excellent binder for sands used in making cores for casting copper, brass, bronze, aluminum, magnesium, gray iron and cast iron. Its big advantages are:

**1. ODOR ELIMINATION** — Foundrez 7605 has been specially developed to eliminate the objectionable formaldehyde odor of conventional synthetic core binder resins, while retaining all the advantages of these products.

**2. IMPROVED SOLUBILITY** — Increased water solubility of Foundrez 7605, compared to conventional synthetic core binders, assures better dispersion of the resin throughout the core mix.

**3. FAST BAKING** — You speed core production by cutting baking cycles with fast-drying Foundrez 7605 binder resin. You save on labor and fuel, too.

**4. EXCELLENT COLLAPSIBILITY** — Cores made with RCI Foundrez 7605 have collapsibility characteristics suited to a wide range of pouring temperatures.

Reichhold can deliver this new liquid resin to you in tank cars, tank trucks (or, at higher price, in non-returnable 55-gal. drums).

Write to RCI for *Technical Bulletin F-8* which gives typical mixes and performance data for Foundrez 7605 core binder.

*Creative Chemistry . . . Your Partner in Progress*

RCI

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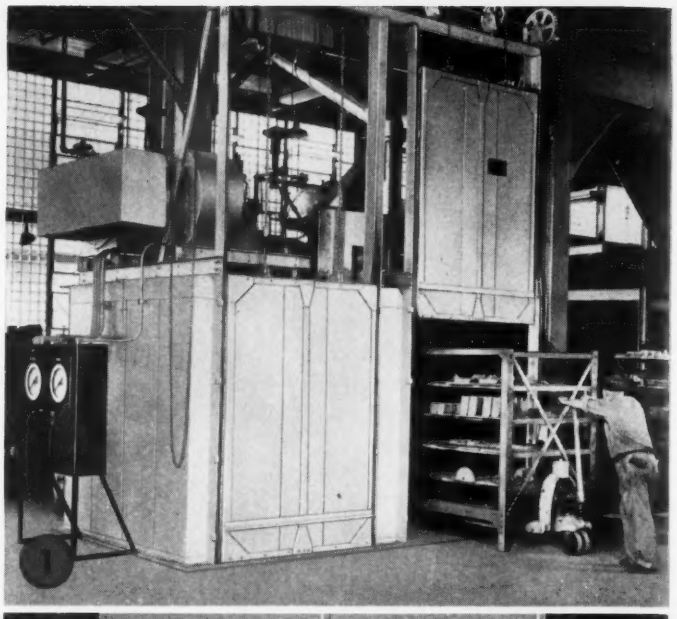
Synthetic Resins • Chemical Colors • Industrial Adhesives • Plasticizers
Phenol • Formaldehyde • Glycerine • Phthalic Anhydride • Maleic Anhydride
Sodium Sulfite • Pentaerythritol • Pentachlorophenol • Sulfuric Acid

**REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.**

NEED MORE OVEN EFFICIENCY?



# carl mayer CAN DO IT

That's right, for any baking requirement there's a Carl Mayer oven that will do the job faster and cheaper, to give you the efficiency so necessary in today's competitive markets.

The exclusive heat recirculation and slotted panel construction features cut fuel costs and heating times by as much as 50%. Uniform temperatures, assured by heat recirculation, guarantee perfect baking conditions throughout the entire oven.

THE carl mayer CORP.

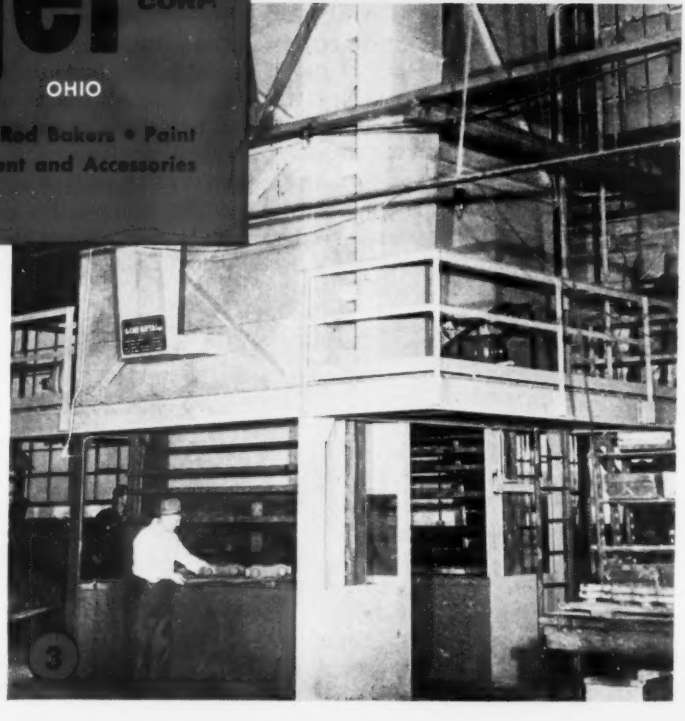
3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

*Write for Bulletin 53-CM*

Hundreds of modern foundries of all sizes have found the efficiency and economy of Carl Mayer ovens pay off. Find out for yourself. Our engineers will be happy to consult with you on your particular problem.

1. This rack type oven, with heat recirculation, holds temperatures within ±5° throughout the oven.
2. Downdraft heating method on this car type oven increases efficiency up to 50%.
3. This vertical oven features the special internal heat fan—increases efficiency, lowers maintenance cost.



vaunted achievements since the year 1900.

Prior to the turn of the century, loam cores and molds required a facing material that could be classified literally as *mud,* cushioned with horse manure, and required an excessive amount of baking time. Even flour-sand cores were worked at a high moisture level. Production was slow, loss was high and the layman's opinion of foundry products was not flattering.

Then came oil sand and the thin-walled jacket core which made the gas engine possible. The coremaker was compelled to lower his water from 7 or 8 per cent to nearer 3 per cent. Molding machines were designed capable of greatly increasing uniform mold hardness and, therefore, of increasing casting fidelity to pattern lines.

High moisture is not compatible with a hard mold, and, since most naturally-bonded sand was worthless with less than 6 per cent water, something had to be done about it. The answer was synthetic—I beg your pardon, "formulated"—sand, which cut the required moisture in half. Wood flour replaced horse manure—and some of the water. Later, with an even newer machine and method, known as high-pressure molding, water in the sand seemingly was pegged at an irreducible minimum.

Now we have shell molding, in which no water whatever is added, and the $CO_2$ process, in which water is used only as a constituent of the binder. Some of our best cores today are made with oil or resin, and water is omitted from the mix entirely.

But, dealing only with orthodox green-sand practice, (which has proved arduous enough for my limited mentality), I have read and studied religiously the arguments presented by my more learned colleagues, whose warnings have been repeated and insistent on the necessity of maintaining precise moisture control. No one, to my knowledge, has emphasized this fundamental truth more forcefully than our good friend Harry W. Dietert, and we should be forever grateful for his missionary spirit. If I seem to belabor the point, it is a point I believe that deserves to be belabored.

My experiments in sand practice were for the most part futile until I realized that Dietert, Schureman and others probably knew what they were talking about regarding water. I would assure you that this knowledge has made my path considerably smoother since I put it to good use.

During my 60 years, I have had few thoughts or experiences about which I could insist that "I know" but I now have no hesitancy in asserting that *I know* moisture control must be first and foremost on my daily agenda. Most of the ills that sand practice is heir to can be either alleviated or eliminated by intelligent control of moisture. Even a casual examination of foundry progress during the past 50 years should confirm that fact.

If your sand is deficient in flowability, if green or dry strength must be altered, if deformation is low or high, then moisture adjustment would seem to be your first consideration, for every sand additive has its special function to perform, and each is in some degree thirsty.

John B. Caine, in an article on steel foundry molding sand, covered one point quite concisely. I quote: "This answer is true in regard to water, for the whole American green sand practice for steel castings is based on low clay contents and the low water contents that are pos-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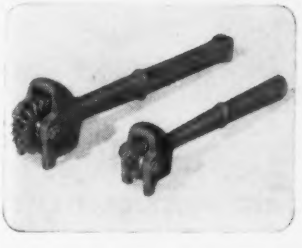
dressers wear longer
cutters change quicker

Longer life—by far—plus quicker, easier-than-ever cutter change are basic improvements in the patented, new type Desmond Huntington dressers. Supplied at no extra cost in No. 1, 2, 21, and 22 sizes. Note the new construction: hardened side washers, press fitted into head, positively secured with slotted hex head bolts and lock washers. Remove one bolt (with wrench or screw driver) to free spindle for quick cutter change.

Ask your Desmond industrial distributor for Bulletin D-48. He can help make your grinding wheels perform better—longer—with proper dressing.

Desmond-Stephan Mfg. Co., Urbana, O.



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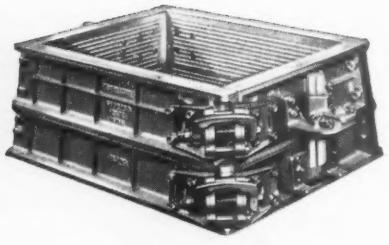
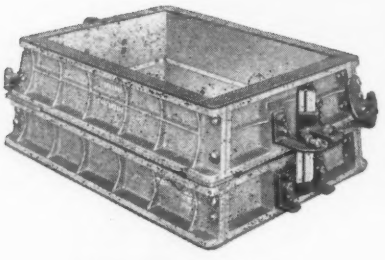
THE ONLY COMPLETE LINE OF GRINDING WHEEL DRESSERS AND CUTTERS

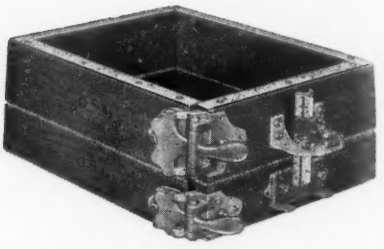
# ADAMS . . . . .



Aluminum Easy-Off Flask



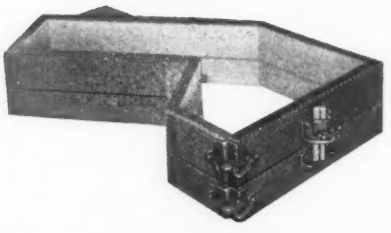
Aluminum Slip Flask



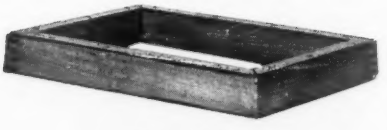
Cherry Snap Flask, tapered

# Flask Equipment to meet

Cherry Snap Flask, Round with Cast Iron or Aluminum Jackets

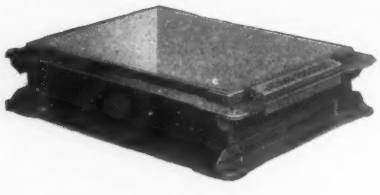


Cherry Snap Flask, Special Shape

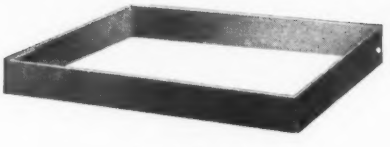


Cherry Upset

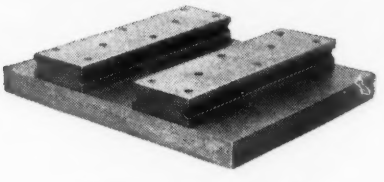
# in practically all methods



Steel Jacket



Steel Band



Cherry Presser Board

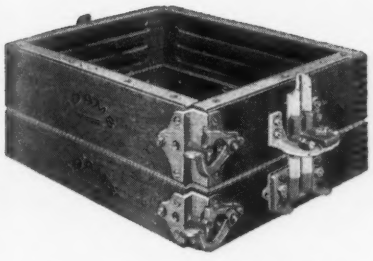
**THE MOST COMPLETE LINE OF FLASK EQUIPMENT**

Stop and get the complete Adams Flask story at Booth 808-810 . . . 1956 A.F.S. 60th Castings Congress and Show—May 3rd to 9th—Atlantic City, New Jersey.

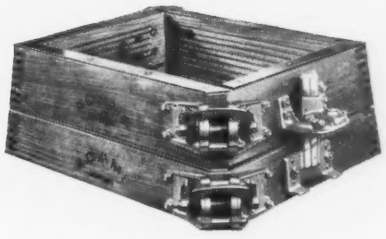
Pin and ear arrangement available to interchange with present Pattern Plate guides.

Handles and trunnions are available where required.

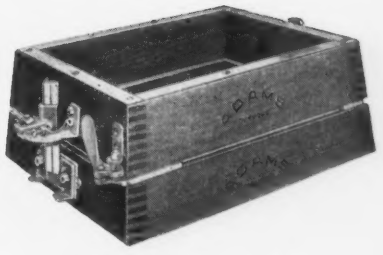
# Manufacturers of



Cherry Snap Flask, straight

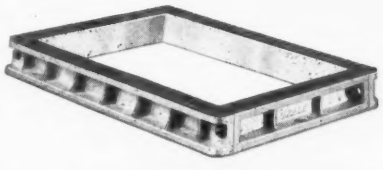


Cherry Easy-Off Flask

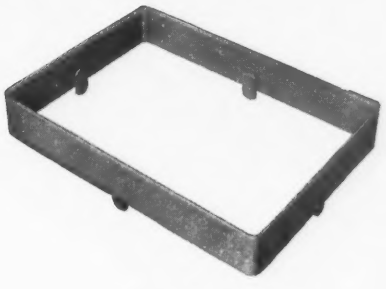


Cherry Slip Flask

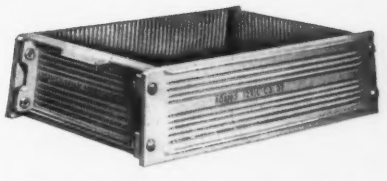
# your requirements



Aluminum Upset

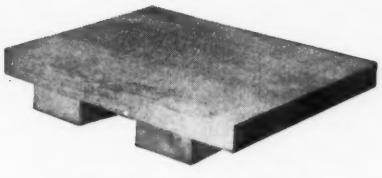


Steel Upset



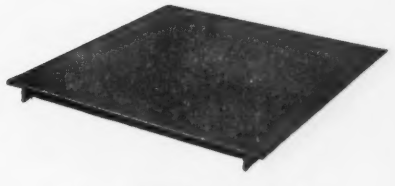
Cast Iron or Aluminum Jacket

# of production.



Wood Bottom Board

No. 1 Steel Bottom Plate



No. 2 Steel Bottom Plate

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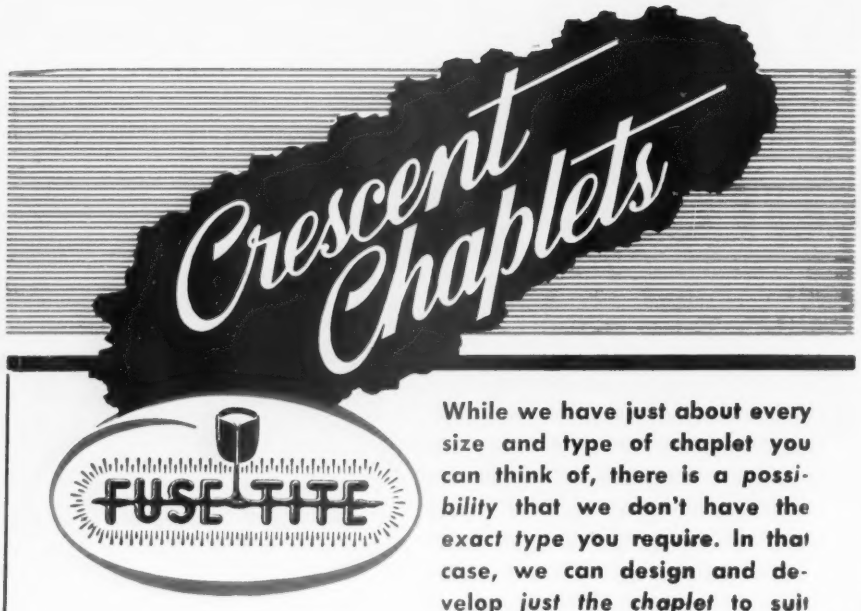


**While we have just about every size and type of chaplet you can think of, there is a *possibility* that we don't have the *exact type* you require. In that case, we can design and develop *just the chaplet* to suit your requirements! We have all sorts of working samples available, and are always ready to ship them in a hurry to those who wish to try them.**

**A FEW OF OUR SPECIALTIES**

- **RADIATOR CHAPLETS**
- **SHOULDER CHAPLETS**
- **BOILER CHAPLETS**
- **DOUBLE HEAD CHAPLETS**
- **MOTOR CHAPLETS**
  Regular or Extended Stems
- **TIN TUBES**
- **CHAPLET NAILS**
  Plain, Nicked or Barbed
- **SKIM GATES**
- **CORE WIRES**
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**Crescent FUSETITE CHAPLETS are accurately made of proper analysis materials for the fusing-in process. We have been devising and supplying chaplets since 1889, and our stocks are amazingly ample and varied. We originated Radiator, Shoulder, Double Head and Motor Chaplets, and if necessary, we can originate Special Chaplets for YOU.**

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sible because of the low clay content."

I expect that one of these days, an article will appear in our technical press devoted exclusively to an analysis of water in relation to its effect on foundry sands. I hope it will be written by a man who knows as much about the molding problem as he does about test tubes and chemical formulas. Otherwise he may use a language that many foundrymen cannot understand—at least, those of us who are most in need of the information. I recognize the difficulty a scientist faces when attempting to translate his findings into the language of the foundry, but until he is able to do so, he is talking only to other scientists.

In my edition of Webster, more than 65 lines of fine print are devoted to a definition of the word "water." Even urine and saliva are classified as water, and although I'll bet Webster didn't know it, both served effectively in ancient sand practice. They were used, with stale beer, to swab projecting mold surfaces. Call it superstition if you will, but the old molder knew that when these obnoxious liquids were used, he had less trouble with blows or scabs.

I'm sure that foundrymen always have known the danger of using water indiscriminately and have tried in various ways to modify its explosive tendency. As apprentice boys, we were told to put soap, oatmeal, plug tobacco and other vegetable matter in our swab-pots. In those days we had a faith sublime, if little else. If a drag-pocket had to be patched, the surface was first moistened with tobacco juice, never with tap water!

Today we resort to soda ash and speak knowingly of pH control. Wetting agents are claimed to affect definitely foundry sand behavior. Diesel oil and glycerine have been added to sand to retard evaporation of moisture and to provide additional values. So-called sand stabilizers now are being sold in quantity to foundrymen who speak confidently of their successful application. Are these mere moisture modifiers? I I wouldn't know, but I do beseech the scientist to clarify this foundry water problem for me.

## Firm Doubles Capitalization

Western Foundry Co., Tyler, Tex., has doubled its capitalization, from $750,000 to $1½ million, and has declared a 10 to 1 split of common stock.

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## TO GET A FULL LOAD

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# TRACTOMOTIVE TL-6 TRACTO LOADER— a high producer in confined areas

No ramming into pile to fill the half-yard bucket of the TL-6 Tracto-Loader. Operator lets the hydraulic torque converter do the crowding — smoothly, steadily . . . and there's a scooping action, too, with the tip-back bucket. You get a heaping load before the booms are halfway up.

On the go, the bucket holds the *full load* . . . has a 50-degree tip-back at only 3 feet above floor — means easier maneuvering, greater stability, better visibility.

Operator has an easy time handling the TL-6. No gear shifting — he just pulls or pushes a lever to change direction. Short, 6½-foot turning radius and over-all compact design make it easy to unload box-cars or travel through narrow aisles and doorways, make hairpin turns near columns and posts.

See the TL-6 in action. Let us make an appointment for you with your Allis-Chalmers Construction Machinery Dealer for a demonstration. Send coupon NOW.

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☐ Please arrange a demonstration of the TL-6
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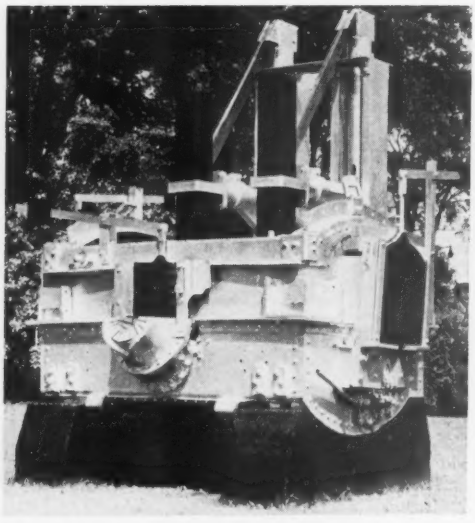
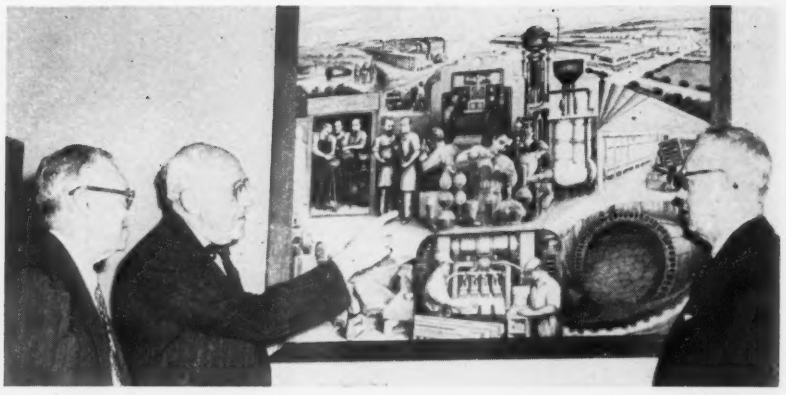
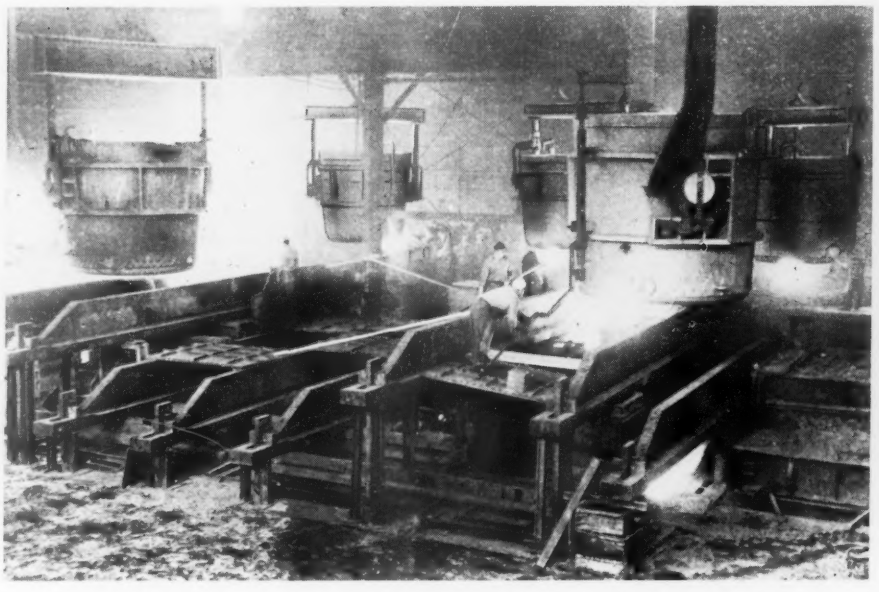
# News Views





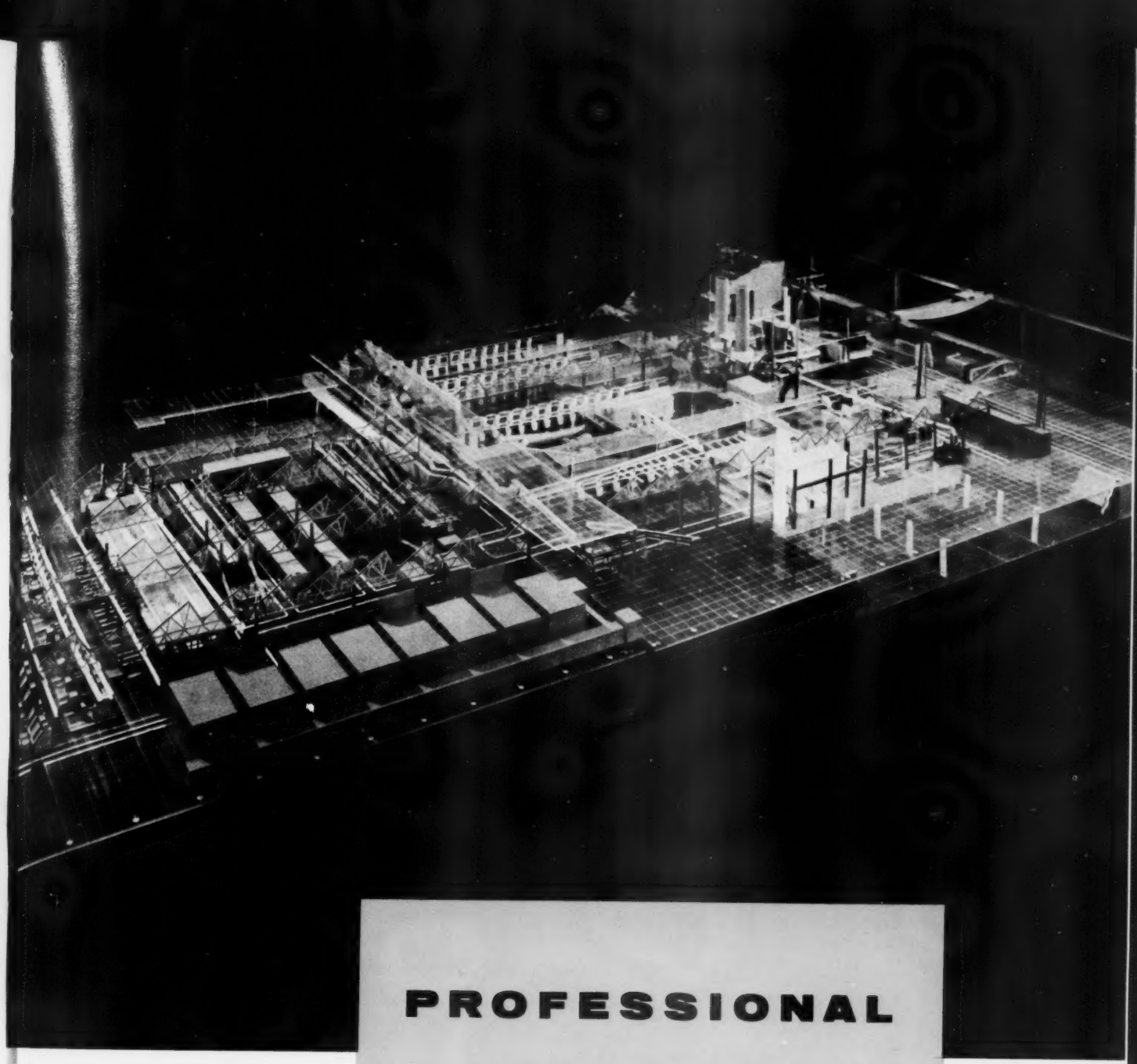
ANNIVERSARY: Robinson Clay Products Co., Akron, O., is celebrating its 100th anniversary in 1956. W. E. Robinson, center, president, points to a mural showing progress of company. S. L. Robinson, credit manager, left, and P. V. Robinson, secretary, also look on approvingly

FIRST FURNACE: The first heat of electric melted steel made in America was poured early in April 1906. The furnace that poured that first heat is enshrined at Crucible Steel Co. of America's Sanderson-Holcomb Works, Syracuse, N. Y., the site of its original installation. The original furnace, shown above, was set up and operated under personal supervision of its inventor, Paul Louis Toussaint Heroult, the celebrated French scientist



LARGE HOUSING: Five ladles, pouring simultaneously, are required to provide 600,000 lb of metal for a 400,000 lb mill housing, believed to be the largest ever cast in one piece in this country. United Engineering & Foundry Co., Vandergrift, Pa., recently cast two such housings with metal taken from five open-hearth furnaces. A minimum of three weeks of cooling is required before castings can be removed from the molds, which were in a divided pit, 32 ft x 86 ft x 18 ft deep

VISITATION: Several Spanish foundrymen and engineers in this country as guests of the government recently visited Allyne-Ryan Foundry Co., Cleveland, to observe operating and personnel practices. Front row, left to right, are Torcuato Requena; Harold Wheeler, personnel director, Allyne-Ryan; Edwards Gonzalez and Vicente Buyo. Rear row, left to right, are Francisco Vallaure, commercial attache, Washington, D. C.; Jose Orejas; Fernando Sanjurjo and Charles E. McKillips, project manager for the International Co-operation Administration, Washington



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Lester B. Knight

& ASSOCIATES, INC.

Three-dimensional model of modern foundry producing pump castings.

# Knight Organization

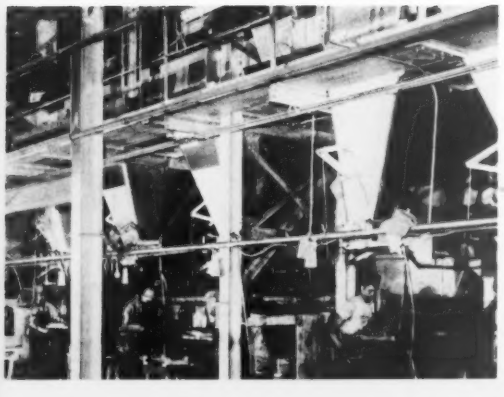
The key men in Lester B. Knight & Associates, Inc. have from 10 to 25 or more years of successful experience in some phase of foundry management, production, engineering or equipment. The coordination of each man's specialized experience enables the Knight organization to give foundry management reliable, practical assistance on virtually all foundry problems.

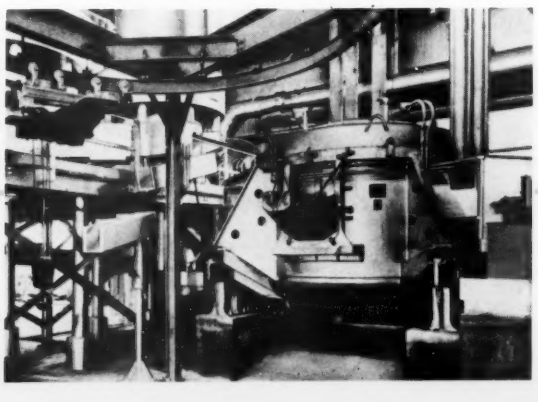
The Knight organization has completed more than 350 successful assignments in every type of foundry—grey iron, steel, malleable, brass and bronze, magnesium, and aluminum. These foundries are producing castings from a few ounces to 50 tons and from 1 to more than 1,500 tons of castings per day. Green sand, dry sand, cement, plaster, "shell" molds, permanent mold, centrifugal, die casting and investment casting operations all have been served by Knight.

Working closely with clients' staffs, Knight Engineers have assisted its clients to audit operations, define management functions, establish organization, modernize methods and facilities, and design complete new plants. They have successfully applied automation in varying degrees to a number of different types of foundries, and have assisted management to establish more economical procedures for the control of operations and costs.

Through the coordinated effort of these experienced men, the Knight organization is successfully furnishing the comprehensive services outlined in these pages.

The years from 1925 to 1950 saw the mechanization and application of production techniques to a large proportion of the Foundry Industry. Many of these highly mechanized plants are obsoleted by new melting, molding and other methods and equipment. The next 25 years should see the further application of modern rigging and methods, automation and new casting techniques and materials which should continue to broaden the market for castings engineered to perform a function.





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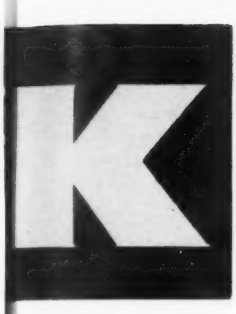

night clients

in the U.S., Canada, Europe, South and Central America. Many of our clients have used us for many different assignments.

**Knight Engineers have worked with clients producing castings for the following industries:**

*Aircraft*
*Automotive*
*Farm Implement*
*Diesels*
*Refrigeration*
*Electrical*
*Machine Tools*
*Plumbing*
*Soil & Pressure Pipe*
*Fittings*
*Valves*
*Machinery & Equipment*
*Hardware*
*Ingot Molds*
*Rolls*
*Boilers & Radiators*
*and many others*

**Acindar**
Buenos Aires, Arg.

**Acinfer**
Villa Constitucion, Arg.

**Alloy Steel Products Co.**
Linden, N. J.

**American Radiator & Standard Sanitary Corp.**
Baltimore and Louisville

**Appleton Electric Company**
South Milwaukee, Wis.

**B.I.F. Industries, Inc.**
Providence, R. I.

**Buckeye Steel Foundry Co.**
Columbus, O.

**Canadian Car and Foundry Company, Ltd.**
Montreal, Quebec

**Chrysler Corp.**
New Orleans, La.

**James B. Clow & Sons Co.**
Birmingham, Ala.

**Combustion Engineering, Inc.**
Chattanooga, Tenn.

**Crane Co.**
Chicago and Chattanooga

**Dalton Foundries, Inc.**
Warsaw, Ind.

**Dayton Malleable Iron Co. (3 plants)**
Dayton, O.

**Electric Steel Foundry Company**
Portland, Ore.

**Erie Malleable Iron Company**
Erie, Pa.

**Fahralloy Limited**
Orillia, Ont.

**Fairbanks, Morse & Company**
Kansas City, Kan.

**Federal Malleable Co.**
Milwaukee, Wis.

**Ft. Pitt Steel Castings Division**
McKeesport, Pa.

**Hammond Brass Works**
Hammond, Ind.

**Haynes Stellite Company**
Kokomo, Ind.

**International Nickel Co.**
Bayonne, N. J.

**Fundicion Macfarlane, S.A.**
Sagua la Grande, Cuba

**Marion Malleable Iron Co.**
Marion, Ind.

**Milwaukee Malleable & Grey Iron Works**
Milwaukee, Wis.

**Moline Malleable Iron Company**
St. Charles, Ill.

**Mueller Co.**
Decatur, Ill.

**National Roll & Steel Foundry**
Avonmore, Pa.

**Pittsburgh Steel Foundry Corporation**
Glassport, Pa.

**Pyle-National Company**
Chicago, Ill.

**Stavanger Electro-Staalverk A/S**
Jorpeland, Norway

**Sulzer Bros. Ltd.**
Winterthur, Switzerland

**Unitcast Corporation, Ltd.**
Sherbrooke, Quebec

**Universal Castings Corporation**
Chicago, Ill.

**Wagner Malleable Iron Company**
Decatur, Ill.

**Woodruff & Edwards, Inc.**
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**Worthington Corporation**
Harrison, N. J.

Soil pipe and fittings foundry for 8,500 tons per month.

## Statement of Policy

Assignments are undertaken when our staff has had successful experience applicable to the problem at hand.

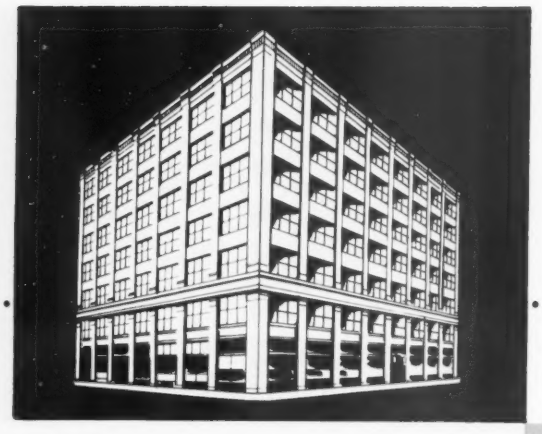
Our policy on all assignments is to define the scope of the project clearly, get the facts, work out a satisfactory course of action with the client and present an agreed-upon solution in a concise, complete report.

The economics of the proposed changes are compared with existing costs to indicate how quickly the required investment may be recaptured or to indicate the possible savings.

Each report is prepared to be used as a guide to carry out the recommended program with or without our assistance, as may be required.

In every case, the program is developed to be installed by a process of evolution not revolution, and with minimum interference to production.

We consider ourselves temporarily a part of our client's organization to assist in developing and carrying out a successful program. We are not interested in the sale or use of any particular make of equipment, but are strictly professional engineers.



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*Management, Industrial and Architectural Engineers*

MEMBER OF THE ASSOCIATION OF CONSULTING MANAGEMENT ENGINEERS, INC

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*917 Fifteenth St., N. W., Washington, D. C.*

*New York Office—Lester B. Knight & Associates, 50 Church St., New York City*

# Foundry Group Meetings

**Texas:** "The Melting of Copper Base Alloys" was the subject of Norman A. Birch, National Bearing Metal Division, American Brake Shoe Co., St. Louis, in a talk before the AFS chapter at the Beaumont Hotel, Beaumont, Tex., on Feb. 17. Speaker outlined the advantages and disadvantages of the basic types of furnaces for melting copper-base metals in terms of cost and productivity for specific functions.

Mr. Birch's experience has indicated that the rotating type indirect arc furnace pays off higher initial cost by substantially lower maintenance. He has found this furnace especially useful for directly melting borings and indispensable for remelting large risers and foundry returns. At his company, he said, arc furnaces have shown twice the productivity for one-third the capital cost of high-frequency induction type electric furnaces.

On Mar. 16, 96 members and guests of the AFS chapter gathered at Western Hills Hotel, Fort Worth, Tex., to hear Clyde A. Sanders, American Colloid Co., Chicago, speak on foundry sands and casting practice. Colored slides complemented Mr. Sanders' talk and illustrated many common defects found in castings.—*J. S. Ahrens, National Carbon Co.*

**Wisconsin:** A general meeting replaced the group's sectional meetings on Mar. 9 at Hotel Schroeder, Milwaukee, as the AFS chapter celebrated management night. Speaker was Charles Brown, work simplification engineer, Texas Foundries Inc., Lufkin, Tex. Several hundred members and guests heard his discussion, "Working Smarter at Texas Foundries." Talk was illustrated to show some of the work simplification techniques.

Belle City Malleable Iron Co.'s glee club sang several songs. This group consists of about 40 members and is in its ninth year. Members are employees of Belle City foundry who meet once a week to rehearse. They have appeared on radio, television and before numerous social, civic and charitable groups.—*John E. Hubel.*

**Connecticut Non-Ferrous:** "Brass Melting" was P. Malloy's discussion topic for the Mar. 21 meeting of the Connecticut Non-Ferrous Foundrymen's Society at the Quinnipiack Club, New Haven, Conn. Mr. Malloy is foundry superintendent, Scovill Mfg. Co., Waterville Division, Waterville, Conn. Brass and bronze melting in oil-fired tilting type crucibles was fully covered with emphasis on equipment maintenance, charging, melting, temperature control and pouring.

Equipment maintenance should be given careful and constant attention, commencing with the proper grade of oil, clean strainers and oil lines and carbon-free burners with steady flow of oil for correct combustion. The need for attention to linings, covers, charging and slag holes also was discussed at some length.

With careful charging and handling, the silicon carbide crucible was


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DUREGAN with its thoroughly coated silica grain firmly bonds the quartz pebbles into place with minimum rebound and drop off.

DUREGAN is screened to meet the requirements of all standard equipment now employed for this type of cupola lining.

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Today's most flexible handling tool

One-man-and-a-COLES does so many foundry jobs so well for so little. At the Dodge Mfg. Co. plant, Indiana, or at your own plant, a COLES helps you perform at peak efficiency inside and out. For handling flasks and heavy castings, for maintenance, for unloading scrap—for 101 important jobs—it's COLES Mobile Cranes.

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Rated capacities of all Coles Cranes are over the side.

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considered the most economical by the speaker. Suggestions were given for installation of the crucible, using a new pot rest for each crucible and making sure each is placed squarely on the rest. Mr. Malloy elaborated on a method to follow in preparing the crucible for melting and the care required to lengthen the useful life of the container.

Temperature and pouring require strict control by skilled teams of pourers and skimmers. Alloy additions also must be carefully controlled for best results.—*Frank B. Diana.*

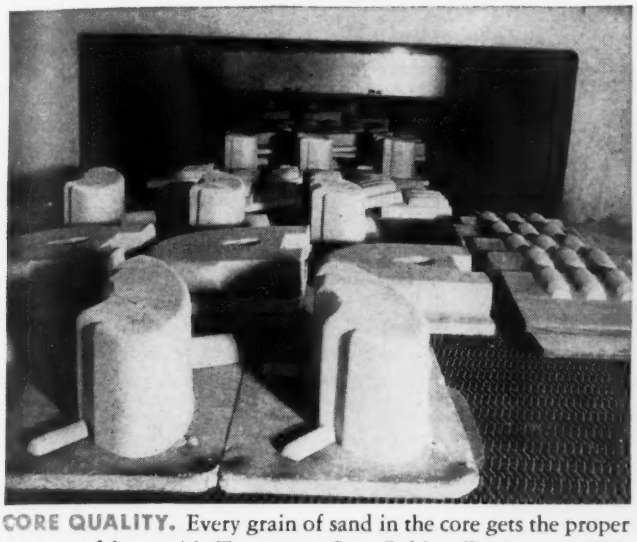
**Connecticut:** Prof. Howard F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass., talked on the "Chemistry and Mechanics of Molding Materials" before the AFS chapter at the Waverly Inn, Cheshire, Conn., on Mar. 27.

Silicic chemistry is a new science that is built around sands and clays. Prof. Taylor cited several examples where practically every industry utilizing sands and clays has profitably conducted fundamental studies on the basic structures involved. The foundry industry, however, is an exception. A foundry engineer knows far less about the building blocks of his mold—sand and clay—than does an engineer in any other field. It is the hope that this gap in the knowledge of foundry materials can be bridged in the not too distant future by thorough, fundamental research.

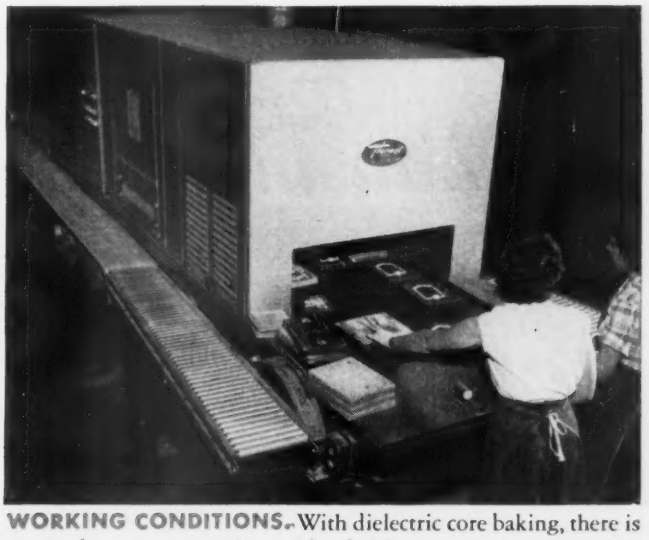
Supporting his discussion by demonstrations, Prof. Taylor showed why a mass of clean, uniform, close-packed sand grains expands when deformed. The space occupied by voids between tightly-packed sand grains amounts to about 26 per cent by volume of the mass. These voids may be filled with air, water, clay, resin or any other material. If the mass is close-packed, as by vibrating or jolting, and there is only sufficient intergranular material to just fill the voids, the mass will resist deformation and will remain rigid. However, once an excess of intergranular material becomes available to fill the larger void volume required if deformation is to occur, the grains will be free to flow and all firmness of the mass will disappear.

Because of friction between flask or pattern side walls and between the grains themselves, it is impossible to pack clean sand grains uniformly by pressure, regardless of the force applied. Furthermore, the sand particles will not flow sidewise or at right angles to the direction of the force. For tightly packing such a sand mass, vibrating methods need further exploitation. If the grains are heavily coated with some material that

# Compare your core-baking to this dielectric performance!

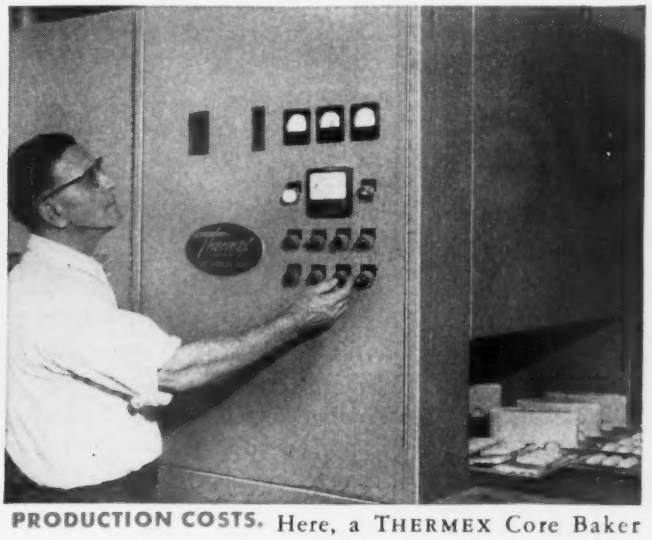


**CORE QUALITY.** Every grain of sand in the core gets the proper amount of heat with THERMEX Core Baking Equipment. This uniform, rapid heat avoids overbaking of surfaces and thin sections and reduces dimensional changes. Castings are more accurate and have smoother surfaces.



**WORKING CONDITIONS.** With dielectric core baking, there is no smoke . . . no oven heat. After baking, cores are cool enough to handle immediately, thereby moving faster to finishing and pasting operations. Core baking operations are compact.

**BAKING TIME.** Here, this 60 KW THERMEX Core Baking Unit reduced baking time from 16 hours to 30 minutes (compared to ovens formerly used). Cores enter unit at left, and exit at right, thoroughly baked.



**PRODUCTION COSTS.** Here, a THERMEX Core Baker produces more cores with one shift than formerly with two shifts. Ratio of helpers to core makers cut from 3:1 to 1½:1. Estimated yearly savings: $10,000.

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will deform plastically under pressure, lateral movement of the mix is possible. Unfortunately, this is not very desirable, for it exposes the low-refractory void material to direct contact with the hot molten metal.—*Gordon B. Mannweiler, Eastern Malleable Iron Co.*

**Pittsburgh:** Victor M. Rowell, vice president, Harry W. Dietert Co., Detroit, addressed a group of about 120 members of the AFS chapter on Mar. 19 at the Webster Hall Hotel, Pittsburgh. He discussed "Synthetic Molding Sands" with comments on sand practices in general. Synthetic sand can be described as molding sand prepared by adding clay or other bond to sand practically free of those materials.

Natural bonded sands have certain advantages, Mr. Rowell reported, as do synthetic sands. Natural bonded sands retain moisture well and are easy to hand-finish. Synthetic sands are more economical in some parts of the country. To be used successfully, synthetic sands must be controlled accurately. Foundries must know the properties of sand to control it and the following fundamental tests should be run as an aid to proper control: Grain fineness and distribution, permeability, moisture, dry and green strength.—*Robert M. Love.*

**Northeastern Ohio:** On Mar. 8, 200 chapter members and guests gathered at the Tudor Arms Hotel, Cleveland, to hear Tom E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Co., Chicago, discuss "High-Pressure Molding." Among those present at the speakers table were W. W. Maloney, A. B. Sinnett and D. J. Hayes, all of AFS headquarters, Chicago.

Mr. Barlow stated that the advantage of the high-pressure molding process to production foundries making nonprecision work lies in its ability to produce uniform castings at minimum weight. For precision work, tolerances of 0.002 and 0.003-in. are achievable. The rest of Mr. Barlow's presentation covered a brief history of the process and descriptions of the molding equipment and the sand employed. A detailed treatment of most of his remarks appeared in FOUNDRY, March, 1956, pp. 104-109.—*Jack C. Miske.*

**Ontario:** One hundred twenty members and guests of the AFS chapter met in Toronto, Ont., on Mar. 23 and heard A. L. Gardner, advertising manager, Pangborn Corp., Hagerstown, Md., talk on "Cleaning Room Economics." Mr. Gardner used

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slides and illustrations to aid his presentation, which emphasized that the right equipment is available to meet foundry requirements, the vendor has the knowledge and is prepared to help solve cleaning room problems, preventive maintenance should not be overlooked, there is an abrasive specially designed to meet all requirements and the cost per ton of cleaning castings is what is vital.

The 30-voice choir of the International Harvester Co. of Canada, conducted by C. Lister, presented a concert as part of the program.—*C. L. Warden, Canadian General Electric Co. Ltd.*

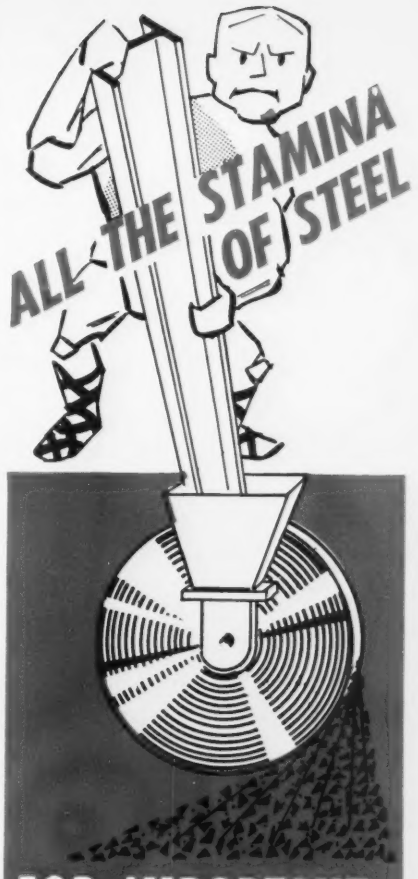
**Twin City:** Warner B. Bishop, general manager, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, spoke before 80 members and guests of the AFS chapter on Mar. 13 at the Covered Wagon Restaurant, Minneapolis. In discussing "Common Sense in Cores," the speaker reviewed the applications and requirements of cores, methods of obtaining maximum properties in cores and important cost factors involved.

According to Mr. Bishop, the greatest cause of core failure is faulty fabricating operations. As sand makes up about 97 per cent of a core's composition, that area should get major attention when core problems are encountered.

The chapter participated in the annual "Career Festival" held on Apr. 10-12 at St. Thomas College, St. Paul. Chapter had a booth in operation under supervision of Mel Schroeder, C. W. Olson Co., Minneapolis. Several thousand high school and trade school seniors and college students attended the festival to meet men of various industries and learn requirements in training and education.—*Robert J. Mulligan, Archer-Daniels-Midland Co.*

**New England:** Ninety-two members of the New England Foundrymen's Association met at the University Club, Boston, on Mar. 14 to hear R. J. Letner, president, Bedford Tool & Forge Co., Bedford, O., talk on use of the cutting chisel. Mr. Letner explained the importance of choosing the right chisel for each job and elaborated on the efforts of chisel manufacturers to produce a better product.—*Fred S. Holway, Mystic Iron Works.*

**Chicago:** Robert P. Schauss, Chicago manager, Werner G. Smith Inc., has been nominated for president of the Chicago Chapter, AFS, for 1956-57. For the current year he has been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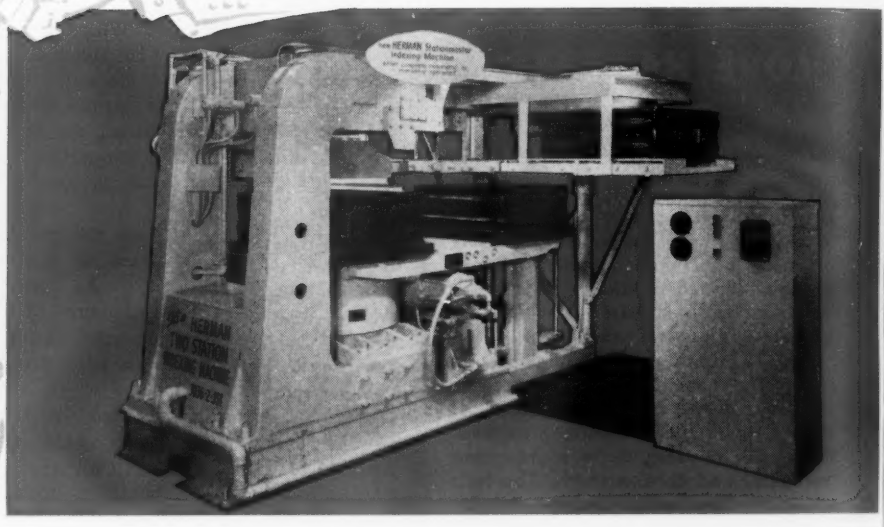

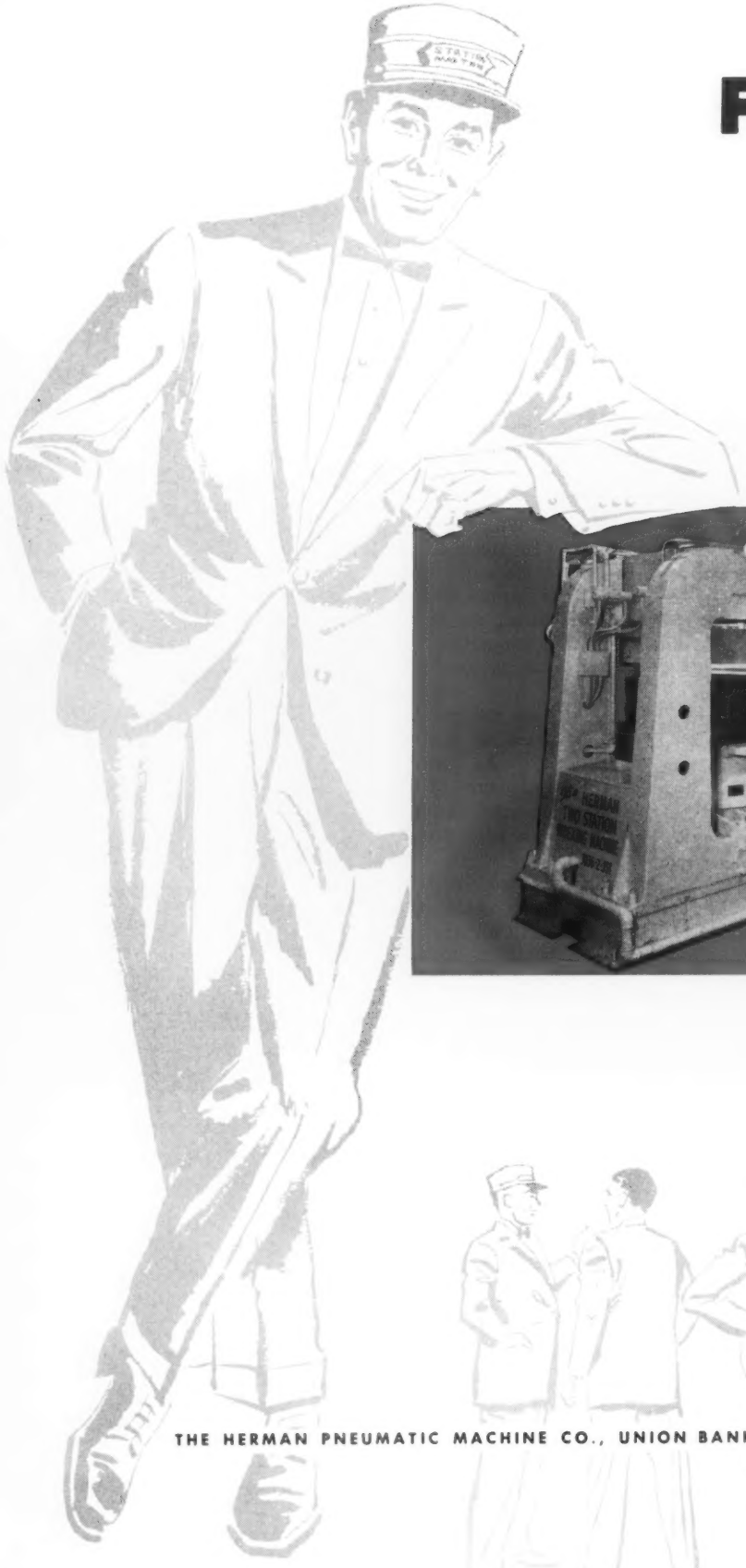

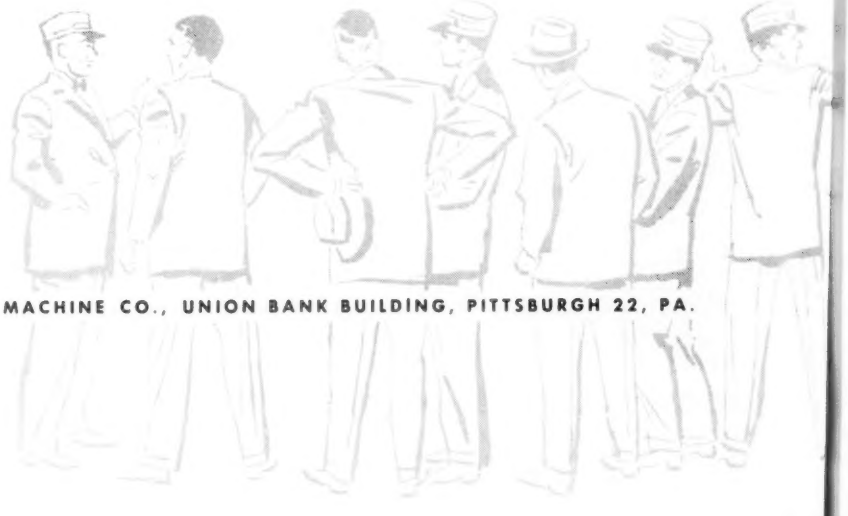

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vice president and program chairman. Nominee for vice president is W. O. McFatridge, supervisor of foundry laboratory, Manufacturing Research, International Harvester Co. Harold L. Oberman, sales engineer, Whiting Corp., is nominee for secretary.

Named for directors are Retiring President James T. Moore, vice president, Wells Mfg. Co.; Roy W. Schroeder, associate professor, pattern and foundry laboratory, Navy Pier Branch, University of Illinois; Edward W. Greenlees, maintenance engineer, Kensington Steel Co.; Don G. Schmidt, metallurgist, H. Kramer & Co.; and P. C. DeBruyne, vice president, Moline Malleable Iron Co.

These nominations were announced at the Chicago Chapter's regular meeting at the Chicago Bar Association, Apr. 2.

President Moore presided at the meeting which was attended by over 235. Vice President Schauss announced that approximately 800 had attended the educational course in March on "Product Improvement."

Four roundtables comprised the technical part of the meeting. The Malleable, Maintenance and Gray Iron divisions combined to hear Robert K. Strong, president, and C. E. Wenninger, technical director, Hydro-Blast Corp., discuss "Wet and Dry Sand Reclamation."

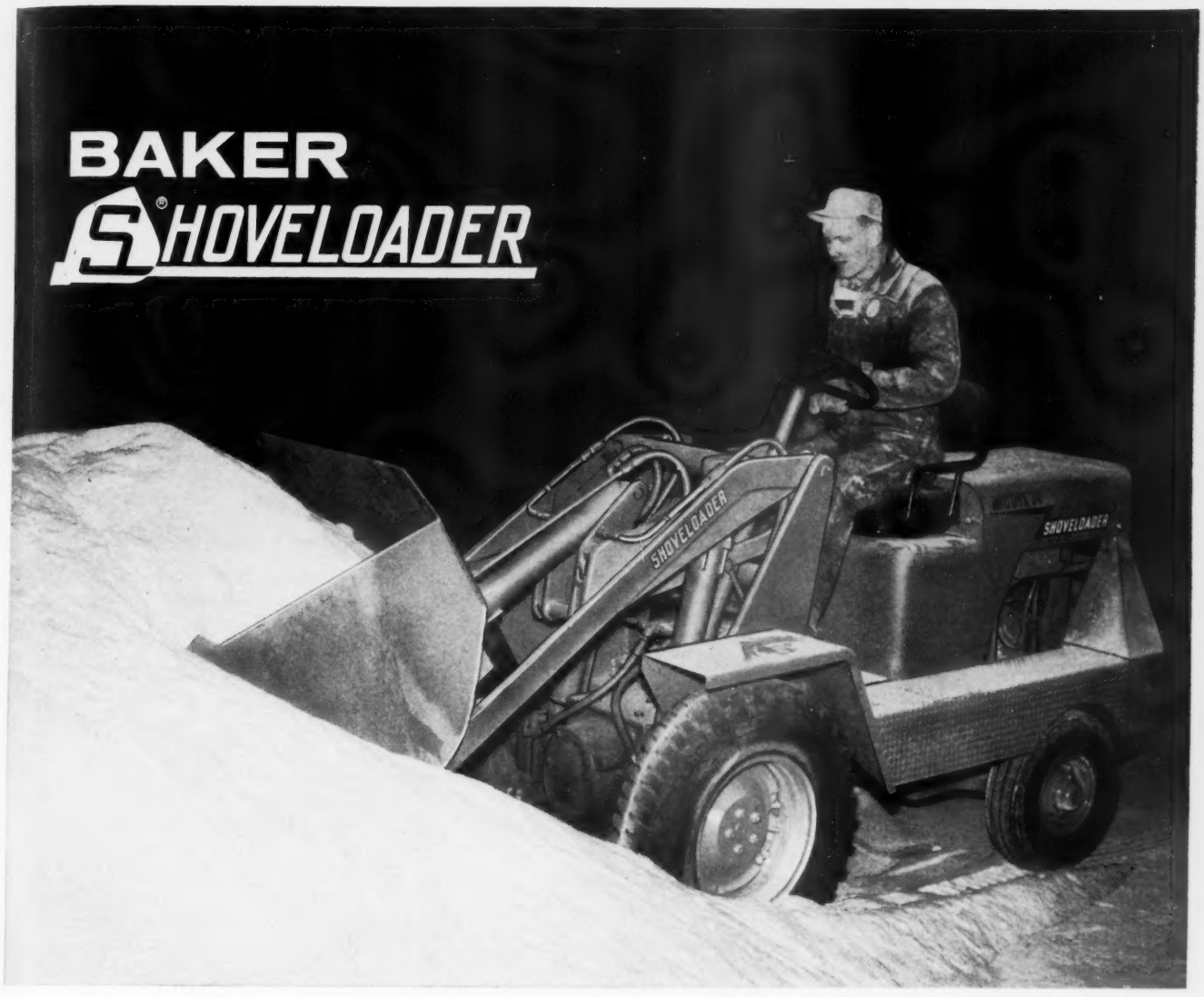
E. F. Kurzinski, laboratory division head, Linde Air Products Co., Newark, N. J., addressed the Steel division on "Use of Oxygen in Steel Melting."

Nonferrous division had "Melting Fluxes and Refractories" as its topic with Ray Cochran, metallurgical engineer, R. Lavin & Sons Inc., as speaker.

Martin C. Ehrman Jr., superintendent, pattern shop, International Harvester Co., Milwaukee, spoke to the Pattern division on "Epoxy Plastic Pattern Equipment."

Because of the national AFS convention, next chapter meeting will be May 14. Through courtesy of Beardsley & Piper Division, Pettibone-Mulliken Corp., a movie will be shown highlighting the convention and show.—*Erle F. Ross.*

**Central Ohio:** The AFS chapter met Mar. 12 at the Seneca Hotel, Columbus, O., and heard a discussion of casting defects by Dan Krause, general manager, Gray Iron Research Institute, and Doug Williams, associate professor, department of metallurgical engineering, Ohio State University. Scabs, blow holes, metal penetration, rat tails, shrinks and veins were defined, their causes enumerated along with remedies for their prevention. Proper gating, correct metal composition and

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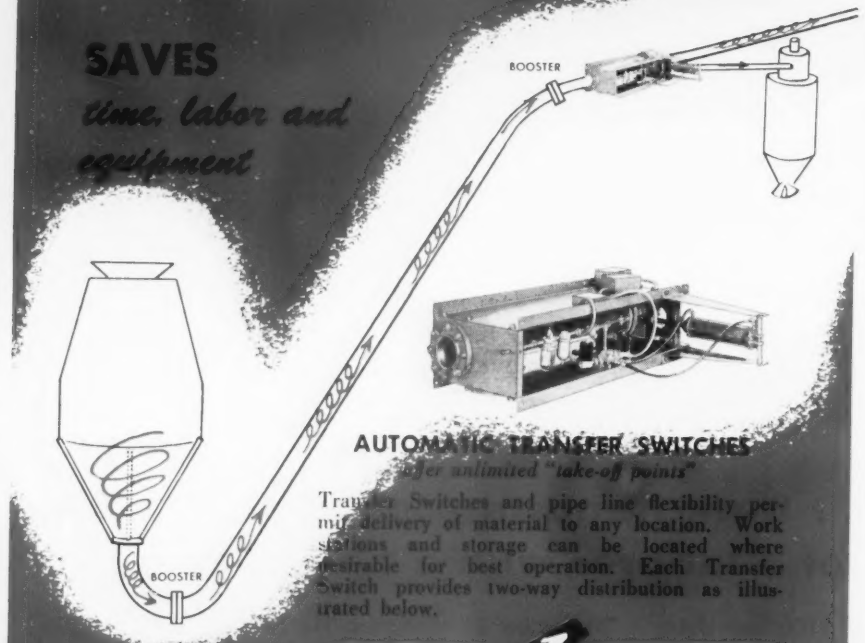


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good molding practices were suggested as methods to combat such defects.—*Jose Acebo, Ohio Malleable Division, Dayton Malleable Iron Co.*

**Reading:** "Sand Control and Its Relation to Casting Defects" was the topic of discussion by George W. Anselman, foundry consultant, Chicago, before the Reading Foundrymen's Association at the Berkshire Hotel, Reading, Pa., on Mar. 20. Talk was illustrated with colored slides.—*William I. Cassidy.*

**St. Louis:** Frank G. Steinebach, editor, FOUNDRY, will address the AFS on May 17. His subject will be "Can We Sell More Castings?"—*John O'Meara, Banner Iron Works.*

## Studies Fracture of Metals

A two-year research project to investigate fracture of metals will be started soon by Northwestern Technological Institute's department of metallurgy, Evanston, Ill. Supported by the U. S. Air Force, the study will complement research begun last June by Northwestern metallurgists on structural changes in metals. Both investigations are sponsored by the Office of Scientific Air Research and Development Command.

Causes of fracture of metal parts at extremely low and high temperatures and the effects of oxygen, carbon and other elements upon the strength and brittleness of metals at various temperatures will be investigated. These studies will be in addition to the work on metal structural changes. Most of the research will be conducted on iron, but other metals also will be used.

## Salt Bath Institute Is Formed

Edward N. Case, sales manager, Ajax Electric Co., Philadelphia, was elected president of the newly formed Salt Bath Institute at a recent meeting in Cleveland. Other representatives were present from Metals Processing Division, American Cyanamid Co., New York; Heatbath Corp., Chicago; A. F. Holden Co., Detroit; E. F. Houghton Co., Philadelphia; and Upton Electric Furnace Co., Detroit.

A membership committee was appointed to invite membership in the new trade association from all manufacturers in the salt bath field. The second meeting of the institute is planned for Cleveland on Thursday, Apr. 26. Headquarters for the group have been established at 7307 Euclid Ave., Cleveland 3.

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The Air-Powered CP Core Box Vibrator is the newest development in foundry equipment for core and pattern making departments. Cores weighing up to 3000 pounds are freed in less than 90 seconds. No more mallet work or sledging to loosen the core . . . just clamp the vibrator to the inverted box; its 9000 orbital vibrations per minute assure a perfect draw. Cores are free of flaws, damaged edges, distorted sections, dimensional variations . . . boxes remain in condition!

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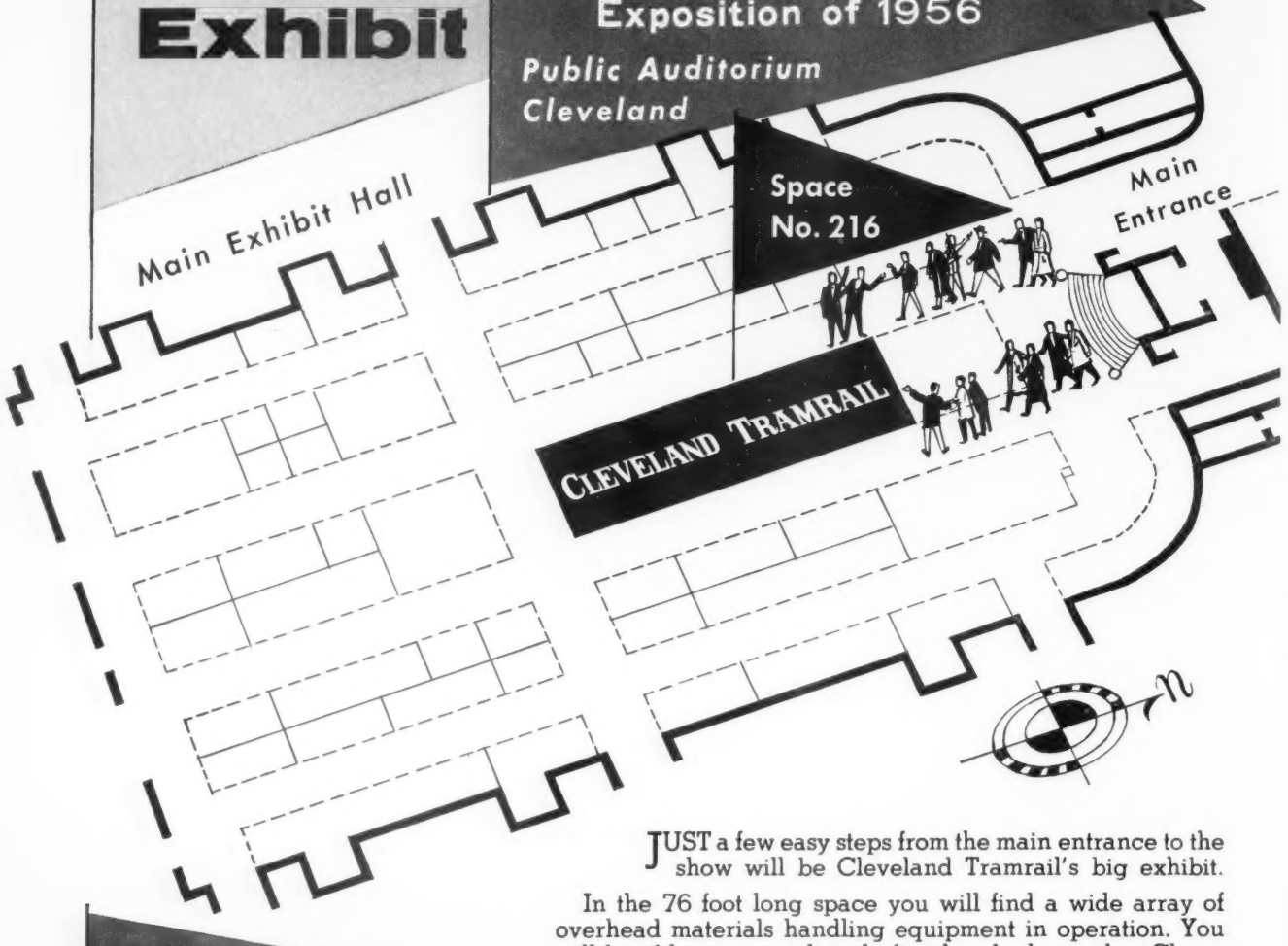


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*For more information, use Reader Service Card, page 347*

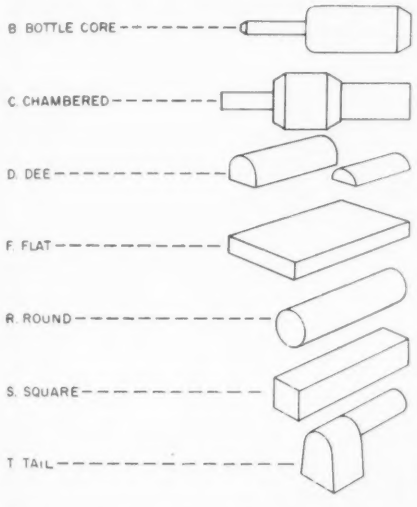
# Standardization of Cores Cuts Costs, Saves Time

## *Simple System Reduces Variety of Cores Used*

By A. H. Squire*

MOST foundries probably use a variety of cores which are similarly shaped and vary only slightly in size. Their shapes ordinarily fall into two groups, those common to the majority of foundries—such as plain round, chambered and bottle cores—and those peculiar to that particular firm. Any reduction in the variety of these cores by standardization usually is profitable.

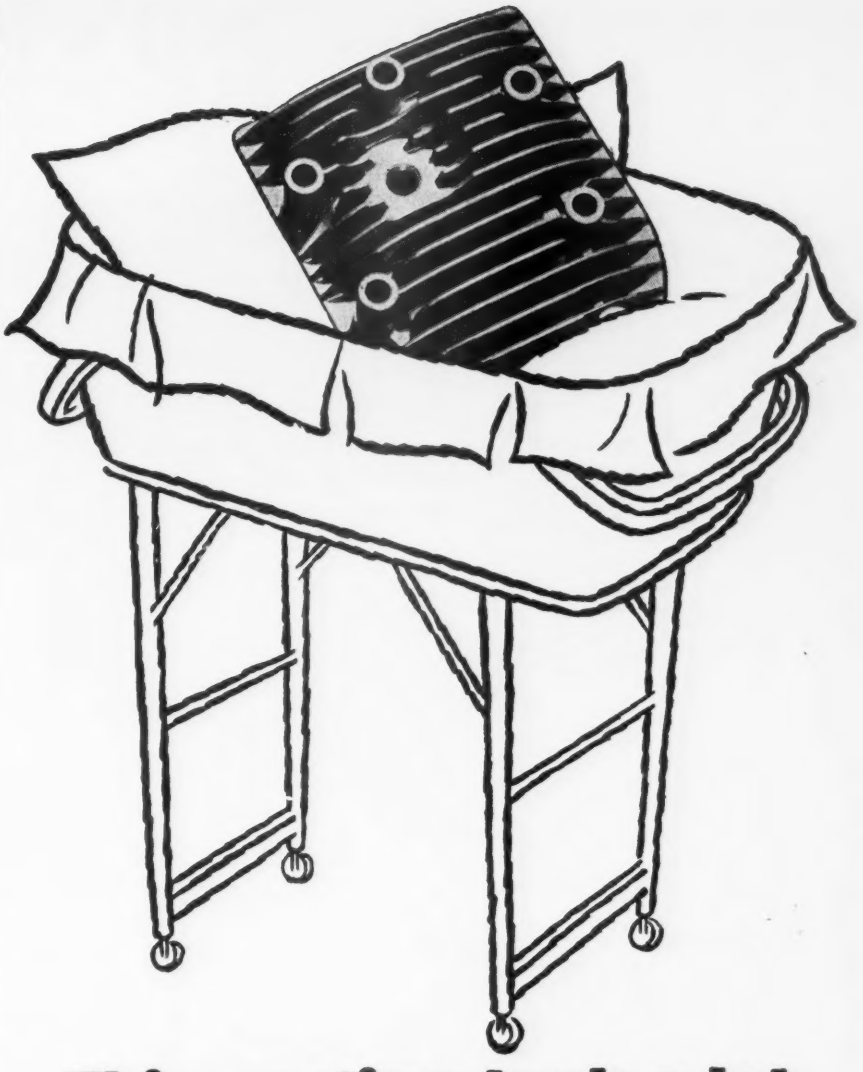
Advantages to be achieved include: 1. Saving in pattern costs by making a minimum number of coreboxes. 2. Saving in time in getting new jobs into production. 3. Ability to use better equipment and more economical methods because standard cores are made in larger quantities. 4. Opportunity to carry cores in stock.




Standardization may be started at any time by dealing with all jobs as they go through the pattern shop or the planning department. Cores must be classified and the information recorded for immediate use at any time. Well known shapes of cores tend to be given a name, usually one which describes their shape or the portion of the casting in which they are used.

A handy reference chart of the type shown here can be made up easily to give the classification of cores. To draw up such a chart, lay out the letters of the alphabet and as far as possible use the initial letter to describe a particular core. Some of the more general types of cores are indicated in the accompanying example, which can be am-

*Patternmaker Foreman, Sutton Coldfield, Warwickshire, England.

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In an attempt to keep costs down, ordinary pig iron was used in the cupola mix. This often resulted in porosity due to excessive shrinkage and open grain structure. Further difficulty was encountered during threading of the fittings. Hard spots in the castings cut the tool life of taps and dies to about 65% of expectancy.

Then, The Terry Company switched to Chateaugay Pig Iron with these distinct advantages as the result: (1) Tough, sound castings accurate to patterns and shapes having relatively thin wall sections. (2) A fine, uniform grain structure that provides better machinability. So much better that tool life has been increased 35%. (3) High tensile strength with resistance to heavy impact. (4) Excellent ductility.

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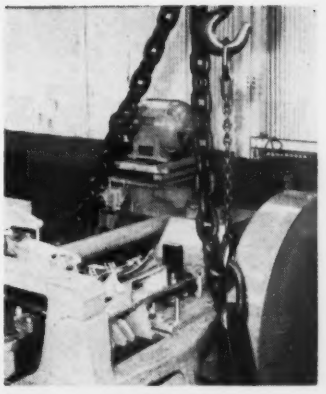
*and Steel Products*



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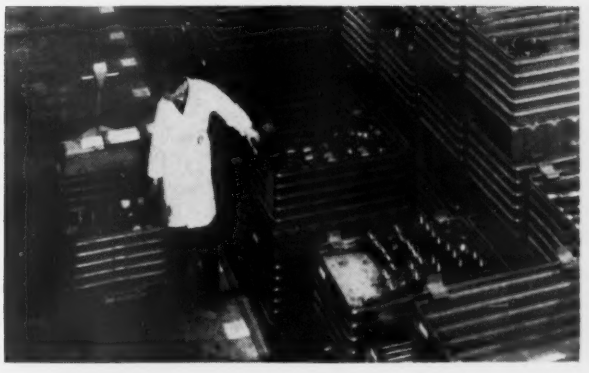
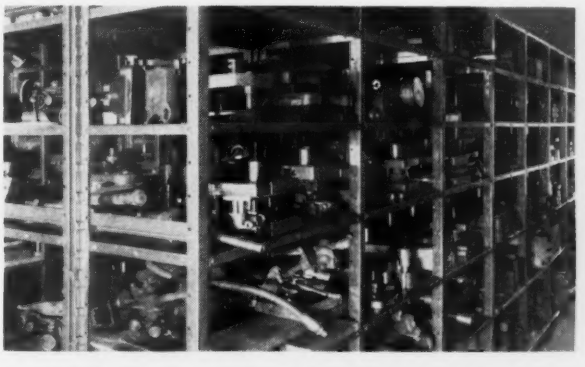


**INCREASE HANDLING EFFICIENCY** with Republic Materials Handling Equipment. Here, PB-120-T Box and Skid Units, equipped for tiering, provide ready accessibility to finished castings . . . permit visible identification and accurate inventories. Republic Materials Handling Specialists will help you design units for your specific needs. Write for Catalog on the complete line.



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# HOOK-ON CLAMSHELLS

## CHECK these exclusive features:

- √ **EASY HOOK-ON—no changeover problem. Versatile.**
- √ **COMPACT, RUGGED DESIGN—longer, tougher service.**
- √ **LIMITED HEADROOM REQUIREMENT—made for tight spots.**
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- √ **¼ TO 10 YARD CAPACITY—models to suit your needs.**

THE FAMOUS **STRAYER ELECTRIC** BUCKET
ALSO AVAILABLE FOR AC OR DC OPERATION

ERIE
BUCKETS THE WORLD OVER

*For Catalogs and General Information, Write:*

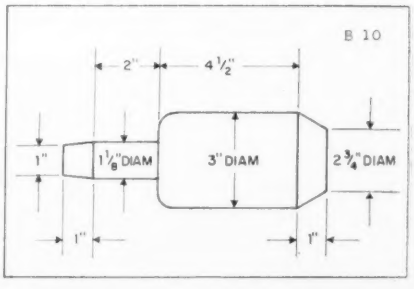
**ERIE STRAYER CO.**
GEIST ROAD • ERIE, PENNSYLVANIA


plified as required.

All bottle-shaped cores, for example, are given a sequence number prefixed by the letter "B": B1, B2, etc. A copy of this chart and the index described below will be used by the patternmaker and the methods engineer.

For the index, use a simple card, perhaps 4 x 6 in., and follow the example reproduced here for the layout. One side is for written details, and the reverse is for a sketch of the core. Note that the core number

| MADE FOR: Universal joint XB 542 | B 10 |
|---|---|
| ALSO USED FOR: Gland CV 5110<br>Base AO 411 | |
| Blower, metal corebox<br>Driers | Cores in stock |




is on the same corner on both sides of the card, so that it will appear in the same place regardless of which way the card is filed. The author prefers to file cards with the sketch side showing. Complicated cores should be drawn and the drawing number cross referenced on the card.

This system works well in practice. The habit of naming definite shapes of cores encourages recognition when a job is set out. Since all similar cores are grouped in the index, they can be scanned rapidly to locate the existing core which comes closest to the one required. Prints are made to suit, and when the pattern is finished, the standard core number is marked on the print.

## Foundry Film Available

Meehanite Metal Corp. has produced a color film, intended to present to the design engineer, the broad fundamentals of the foundry art. It furnishes a series of basic design rules covering the advantages and economies in the use of metal castings. Film consists of 52 frames on a 35-mm filmstrip with 12-in. 33⅓-rpm record. Running time is 35 minutes. It is available on loan or can be purchased for $125 from Meehanite Metal Corp., 714 North Ave., New Rochelle, N. Y.

# PROOF...WORLD-WIDE

## PlastiSand® PROCESS

ACME RESIN

### Factors that have earned world-wide acceptance for the PlastiSand Process . . .

**ECONOMY** . . . Foundries using the PlastiSand Process report superior molds with as little as one-half the resin content formerly necessary with dry resin.

**SHORTER DWELL, FASTER CURE** . . . Less time on the pattern and a faster baking cycle mean more production, add to the economy of using the PlastiSand Process.

**NON-SEGREGATING** . . . Each grain of sand is completely and uniformly coated with liquid phenolic resin in the PlastiSand Process—segregation cannot occur.

**SUPERIOR TENSILE STRENGTH** . . . PlastiSand molds have much greater cold strength, a factor gaining importance as new stack pouring techniques are developed.

**DUST FREE** . . . Because liquid-resin is used there is no dust. An invaluable safety and health factor. The absence of dust means healthier working conditions, no irritating dust fumes, no danger of dust explosive.

**NON-CLUMPING** . . . Sand, treated with the PlastiSand Process is always free pouring—regardless of temperatures.

**GREATER PRODUCT UNIFORMITY** . . . Because it is non-segregating, resin-coated sand prepared by the PlastiSand Process yields almost identical molds, batch after batch.

***This informative booklet may be obtained by writing to Acme Resin***

*Resin formulation and the coating process covered by Patents 2,706,163 and 2,706,188*

Utilizing liquid-resin coated sand in shell molding, the PlastiSand Process has gained world-wide acceptance since its introduction just 4 years ago. Foundries in England, France, Germany, Austria, Canada, Japan and Italy, in addition to one hundred and eighty-five foundries in the United States, are now using the PlastiSand Process.

Improved production methods know no language or boundary barriers. Shell molding foundries *everywhere* are discovering that the PlastiSand Process offers positive advantages—proved in production.

The PlastiSand Process is adaptable to dump-box, roll-over and blowing of either shells or cores.

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***SPACE 1305***

**ACME** RESIN CORPORATION
1401 CIRCLE AVENUE • FOREST PARK, ILLINOIS

# Around the Country

NEWS REPORTS FROM

**Philadelphia . . . Chicago . . . New York . . . Detroit . . . Milwaukee . . . Indianapolis**

***Chicago***—International Molders and Foundry Workers Union of North America early in April sought a wage increase of 25 cents an hour and other benefits from about 70 foundries in Chicago, Aurora, Joliet and Batavia, Ill. The request was made to individual foundries as well as the Chicago Foundrymen's Association as representative of 30 of the shops.

The union also is demanding an improved vacation scale, a pension plan, welfare plan improvements, and an adjustment of certain inequities. Present pay scale is $1.76 an hour for labor and $2.23 an hour for molders and coremakers.

In 1954, foundry workers received an increase of 5 cents an hour in basic wage rate and another 6 cents last year. In most foundries, contracts expire April 30.

On Mar. 12, the city of Gary, Ind., held a Founders' Day banquet which kicked off a golden jubilee program to be celebrated this year. This city of 155,000, is the creation of United States Steel Corp., which in 1905 purchased a tract of 8000 acres there. The site then consisted of barren sand dunes and swampy meadows. The city was chartered Apr. 18, 1906, and was named after Judge Elbert H. Gary, first chairman of the board of the corporation.

Construction of Gary Steel Works dates from Mar. 12, 1906, when a trio of engineers drove stakes into the sand waste on the southern shores of Lake Michigan. Within three years steel was being produced, and today Gary Steel Works is the world's largest, fully integrated, steel producing plant. The site for the new steel city was laid out on Apr. 18, 1906.

Perhaps it is not generally known that Gary Steel Works has a foundry which pours steel and brass and bronze in production of sand castings for the company's own use. Steel is melted in two open-hearths of 28-ton capacity each and red metals in two 2000-lb crucible and one 5000-lb. noncrucible furnaces. The foundry has its own pattern shop.

***Milwaukee***—For about 20 years, Milwaukee has been testing all castings purchased for city use in its own fully equipped laboratory. Robert A. Burmeister, engineer of materials for the city, is in charge of the lab, with ten men, all experts in the testing of materials, under his jurisdiction.

Although not a showplace, the laboratory has had many visitors from time to time. Apparently, few municipalities are equipped to make tests of castings and other purchased materials in a manner similar to or on as large a scale as is Milwaukee.

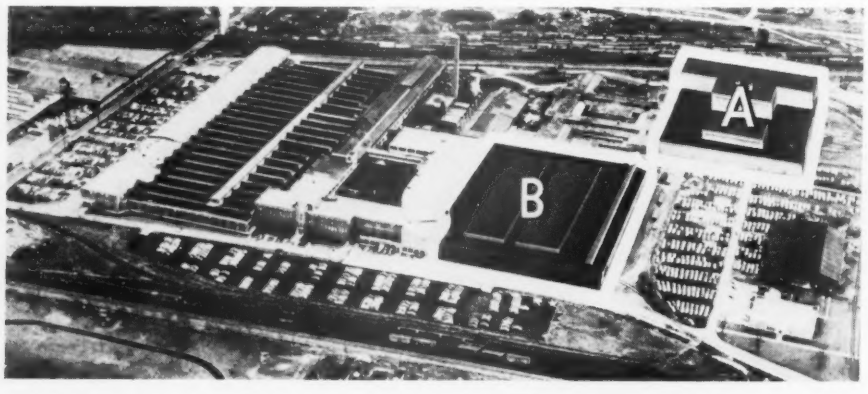
The story is told of a visit of a representative of the Milwaukee testing laboratory to several cities in the East, to learn about methods used in testing by other municipalities. There were few testing labs in the other cities visited, and not many that were comparable to the Milwaukee testing department. It is reported, however, that many cities now are installing or have recently installed labs to test all materials purchased and to make sure that their specifications have been met.

Upkeep of the Milwaukee testing laboratory is paid for as follows: All testing done for the purchasing department is charged to that department, except for work done on materials and equipment for the public works department. Some of the work of testing materials purchased is done at the supplier's plant. For instance, water pipe, valves and hydrants for the water department are tested before shipment from the supplier's plant to Milwaukee, but a final inspection is made after delivery to the city.

In the purchase of castings for city use, an inspector from the Milwaukee laboratory is sent to the foundry supplying the castings. He sees to it that test bars are taken from each heat and that samples of the castings are tested before shipment is permitted to go forward. The test bars are given tensile and hardness tests at the city lab. All casting defects are noted and called to the attention of the supplier. One inspector is on hand at the foundry when the castings are poured.

All of the castings purchased by the city of Milwaukee are bought on a piece basis, and are inventoried that way. Many tons of castings are purchased by the city each year, from small pieces up to the largest on record in the purchasing department—a 48-in. water valve which, with operating mechanism, weighed about 10¼ tons.

The city owns the patterns from which castings are made for its use, and all patterns are purchased on a competitive basis since the city has no pattern department.

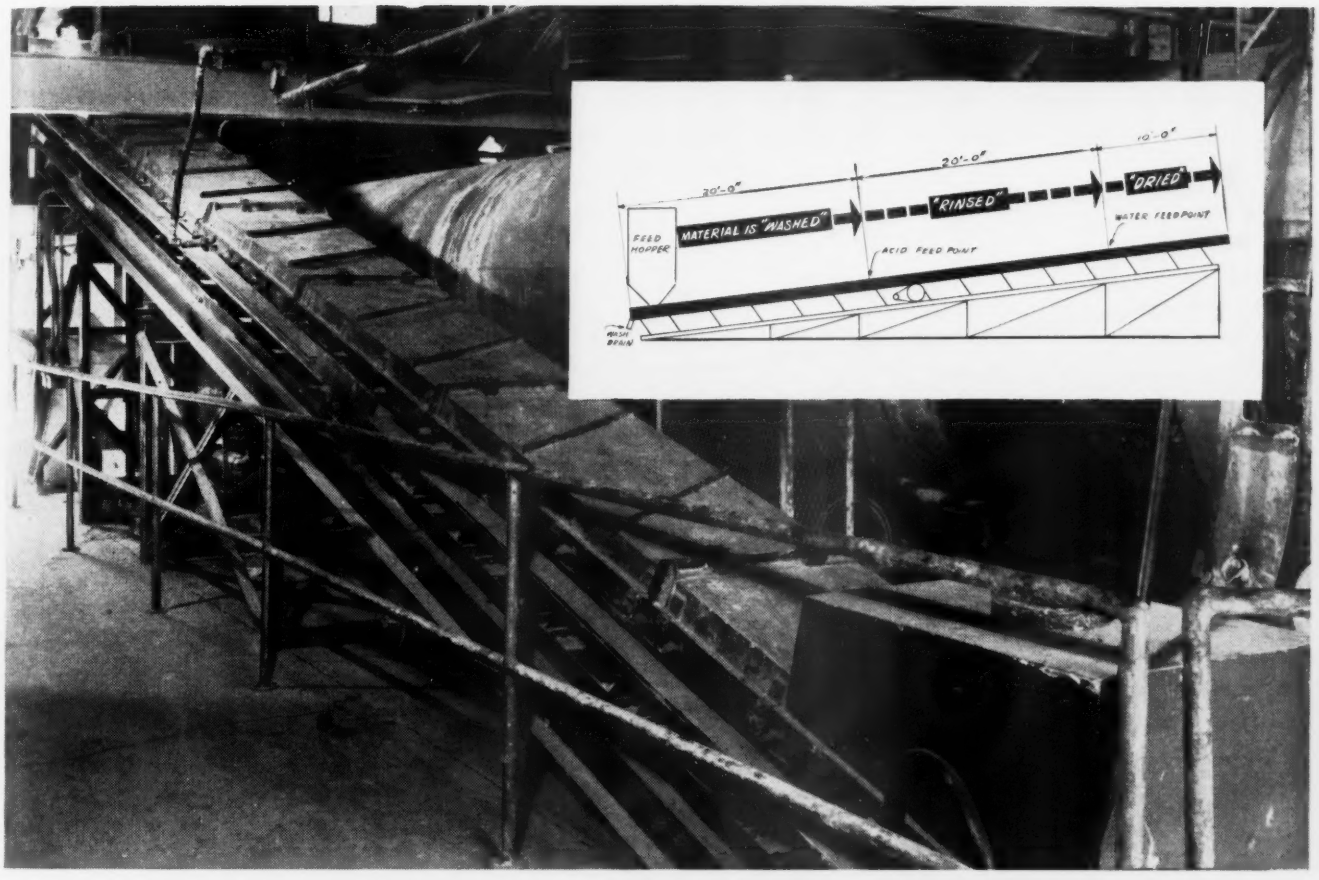



Link-Belt Co., will construct a new foundry ("A") at its Indianapolis plant. Present foundry ("B") will be razed and replaced by manufacturing facilities

***Detroit***—Chrysler Corp.'s gas turbine test car recently completed a run from New York to Los Angeles. The 3020-mile endurance run was the first transcontinental journey for a gas turbine-powered automobile. The 1956 Plymouth sedan, a standard production model except for the engine, started from New York on Mar. 26 and arrived at Los Angeles Mar. 30.

Purpose of the road test was to check the turbine's performance in city and highway traffic, under various climatic conditions, at different

# CARRIER *does the "IMPOSSIBLE" for the biggest names in industry!*




## "Dy-Dee Service" for ORE— Leaching, Rinsing, Drying!

THE photo and diagram show you how ore is "washed-rinsed-and-dried"—*in one continuous operation,* for one of America's largest industries.

It used to be a three-step, batch process. First the material had to be leached in a big vat to reduce salt content. Then it was transferred to another tank for rinsing. Finally it was removed to another location for dewatering. It was a slow, cumbersome, expensive process.

Streamlining this operation was a cinch for Carrier engineers. In a matter of weeks they designed a 50′ Natural-Frequency Conveyor to do all three jobs, continuously. As the material moves onto the conveyor, a weak acid bath flowing down the pan leaches out the salt. Then it is rinsed with a water bath. Finally as it continues up the last 10′ of the conveyor, it is dewatered by vibration plus gravity.

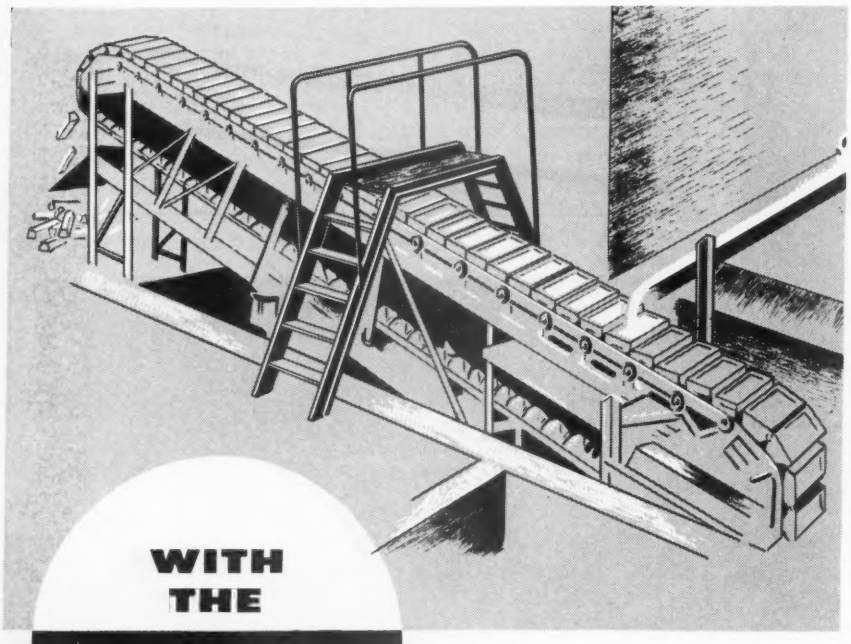
There's no fussing with batches, no spillage, no costly manpower. What's more, there's a big saving in floor space and processing time has been cut by approximately two-thirds.

Agitation of a solid and a fluid, in a controlled continuous contact and separation cycle, is a natural for Carrier, who pioneered and specialize *exclusively* in Natural-Frequency Vibrating Equipment. How about your operation —aren't there some spots where heat-treating, quenching, cleaning or other processes can be combined? Tell us about them and let us see what we can work out for you.

**CARRIER**
~~NATURAL-FREQUENCY~~
**CONVEYORS**

Carrier Conveyor Corporation
215 North Jackson Street, Louisville 2, Kentucky

# Simplify Pig Casting Operations . . .



WITH THE

**Bailey**

**PIG CASTING MACHINE**

- 80% of moving parts eliminated by stationary wheel design
- Capacities from 3 to 50 tons per hour
- Lengths: 15 to 125 feet, in multiples of 5 feet

The unique "stationary wheel" design greatly increases service life and pig casting economy for foundries and small metal producing plants. With this design the roller bearing idler wheels are mounted on the frame rather than on the moulds– thus keeping them far as possible away from hot metal.

WILLIAM M. **Bailey** COMPANY

ENGINEERS

LEADERSHIP THROUGH QUALITY

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altitudes and on all kinds of grades. Drivers of the test car conformed to local speed limits and traffic safety regulations throughout the entire trip.

According to James C. Zeder, vice president in charge of Chrysler engineering, the turbine experienced fewer failures than newly-designed piston engines have when submitted to the same test. Only twice were repairs made—to replace a faulty bearing in the reduction gear and to replace an intake casting which failed due to metal fatigue. Prior to the transcontinental road test, the engine had been run for thousands of miles at Chrysler's proving ground and for many hours in the laboratory.

Fuel consumption over the entire trip averaged between 13 and 14 miles per gallon.

When asked to comment on the road test, George J. Huebner Jr., Chrysler's executive engineer in charge of research, said, "We were simply delighted with the car's performance. We had to find out what kind of changes we had to make in our thinking to design a prototype automotive power plant. This trip gave us the answers we were seeking so that now we can design a turbine which is not a laboratory development instrument but an actual automotive power plant."

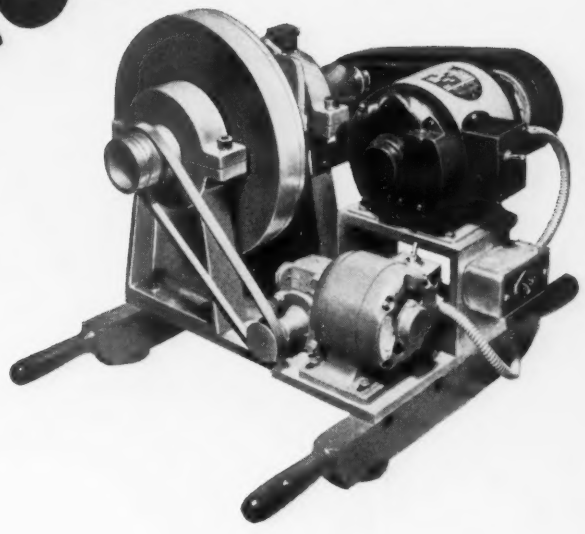
***Philadelphia***—Foundry operations continue active. Gray iron shops are running at about 85 per cent of normal capacity. Actually, most foundries are working at least five days a week and in some cases six. This latter is true of some of the heavy shops, although there is little, if any, melting on the sixth day. A still higher rating than 85 per cent would be reached if more foundries were operating with full working forces. Normal is generally defined as a 5-day week with full employment.

While gray iron demand is diversified, the emphasis appears to be on pipe, heavy machinery and auto die work. Textile machinery requirements are holding up well, with one eastern Pennsylvania foundry, which specializes in this work, operating at a full 100 per cent. Gray iron jobbing shops are promising deliveries of four to eight weeks, depending on the nature of the work.

Business in steel castings is active, probably the best in almost a year, reflecting particularly a pickup in demand from the railroads and power utilities. Backlogs average eight to six weeks, it is said. Malleable shops reflect easing in automotive demand. However, inquiry is still active for hardware and pipe

# ALERT FOUNDRYMEN

# DON'T GUESS-TEST!



**THE ONLY TESTING MACHINE ENGINEERED TO GIVE ALL THESE ANSWERS:**

1. The life value of any abrasive.
2. Number of impacts and pounds of abrasive consumed in production blast machines.
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4. Peening results obtained by use of almen strips.
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6. Duplicates the action of production blast machines.

Laboratory and research departments of progressive foundries want to know *beforehand* what they can expect from the kind of abrasive they buy.

ALLOY METAL ABRASIVE CO. offers the only testing machine which will accurately determine all the factors that insure complete satisfaction from any type of abrading material used in impact cleaning and peening.

CHECK WITH US AT THE FOUNDRY SHOW . . . . . .

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# ALLOY METAL ABRASIVE CO.

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# Sheboygan Castings Corporation turns to $CO_2$ Process and STEINEX* ... Doubles Production of Large Cores!

**CORE OVENS** *Used for Sand Storage . . .* this Wisconsin foundry now produces all large cores by the $CO_2$ Process using STEINEX—has abandoned oil sand core production.

In this very factual letter, Harry Rogers, General Manager of SHEBOYGAN CASTINGS, tells why he now produces all large cores by the $CO_2$ Process using STEINEX.*

Since it was imperative that production of large cores be stepped up greatly—without additional oven, work or storage space—this foundry turned to the $CO_2$ Process using STEINEX. *Cores are hardened right in the core box.*

Sheboygan Castings Corporation

Ask for a copy of this fine testimonial letter

### *HERE ARE THE AMAZING RESULTS:*

- Production was doubled with the same crew.
- Core storage, a big problem in the plant, is now non-existant.
- New space is now available for mold production.
- Existing wooden core boxes are used.
- Use of core rods greatly reduced.
- Core gas emission from molds has been reduced over 50%.
- Accuracy of cores was greatly improved.

*__STEINEX__ is a remarkable core sand binder. Cores and shell molds, made of sand mixed STEINEX, can be hardened right in the core box in a few seconds by the injection of carbon dioxide.

CARVER FOUNDRY PRODUCTS CO.
1060 Hershey Ave., Muscatine, Iowa

- ☐ Send a copy of the Sheboygan Castings letter.
- ☐ Send a copy of Handbook on the $CO_2$ Process
- ☐ Have a sales engineer call.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

*Manufactured by...*

STEINEX

# CARVER

FOUNDRY PRODUCTS CO.

1060 Hershey Avenue, AMherst 3-1845, Muscatine, Iowa

**See our exhibit at the Show.**

fittings, and is moderately good for railroad requirements. Most brass shops are doing well, particularly those engaged in heavy work. Aluminum shops are running at virtual capacity, with commercial and government aircraft requirements outstanding.

Recent increase of $1.50 a ton on pig iron is expected to be followed by a further advance this summer, as steel labor contract adjustments are likely to increase producers' costs.

***Indianapolis***—Link-Belt Co., Chicago, will undertake a $3½ million expansion program for a new foundry and manufacturing facilities at its Ewart plant in Indianapolis. The new foundry will incorporate the latest techniques and mechanization in foundry practices. Ground will be broken shortly, and construction is expected to require a year. After completion of the new foundry, the present foundry will be razed and will be replaced with new manufacturing facilities which are expected to be completed by about midsummer of 1958.

The Ewart plant is the largest single unit of Link-Belt Co. and is one of the largest plants in the world devoted to the manufacture of power transmission chain and sprockets and material handling equipment.

***New York***—Most gray iron shops are working five days a week, with the average well sustained at around 80 per cent. Castings going into building work are in good demand, and machinery requirements are holding up well. Most delivery promises range four to six weeks, although better can be done in some instances. Where gray iron shops are working five days a week—or more, as a few are doing—full working forces are not always being employed.

The limited malleable and steel casting capacity in this area is working close to 100 per cent. Producers of heavy nonferrous castings are doing well. Captive shops—those engaged in pump, ship propeller, heavy valve work, etc.—are having to sublet work in some cases. There is little overflow on the lighter work, however, although business in such items as plumbing supplies and water meters is brisk.

In general, brass and bronze shops as well as light metal foundries, are busy. Where aluminum casting plants are not fully engaged in aircraft work, they manage to keep active on such commercial demands as components for washing machines, oil burners and other household durables.

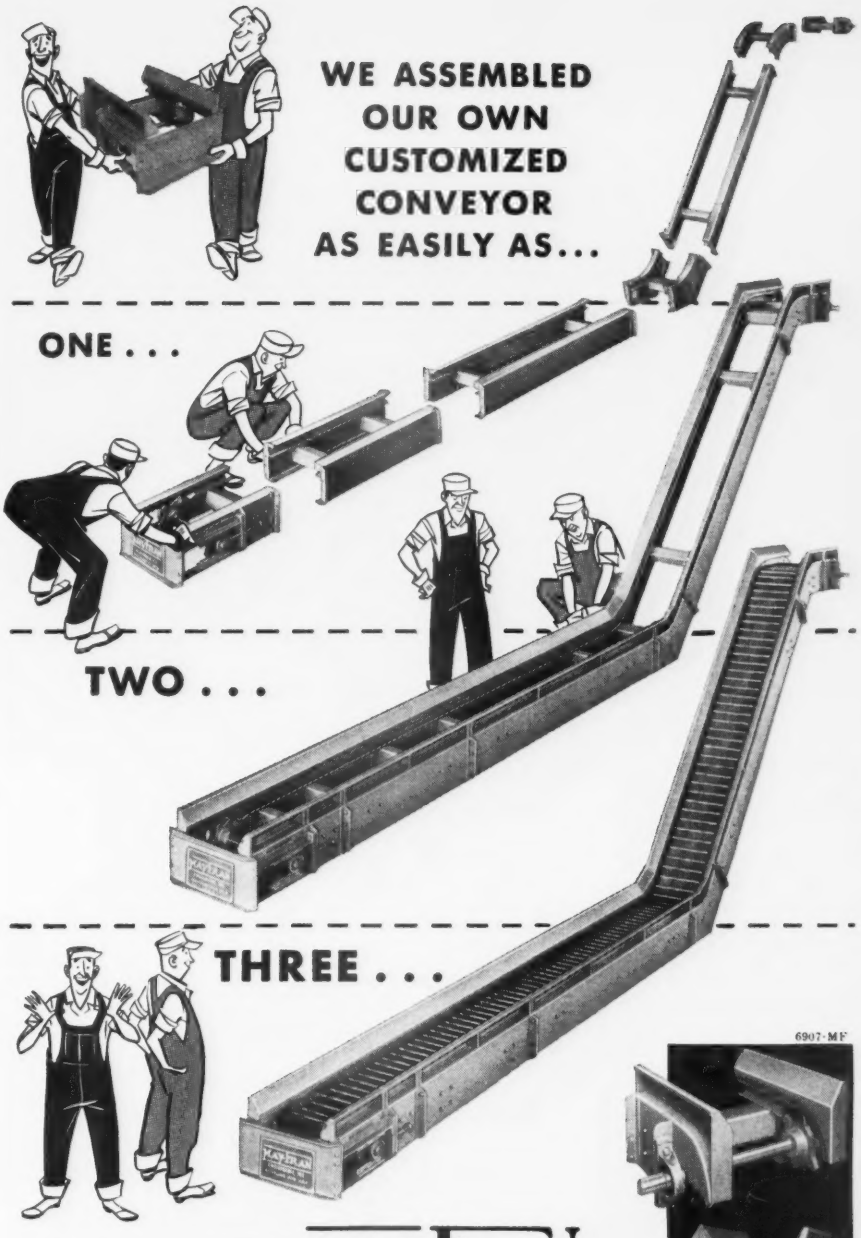



WE ASSEMBLED OUR OWN CUSTOMIZED CONVEYOR AS EASILY AS...

ONE . . .

TWO . . .

THREE . . .



WITH MAY-FRAN STANDARD COMPONENTS

Through standardization, MAY-FRAN now makes it possible to assemble mass produced components into virtually any type of conveyor to handle a wide range of products or materials.

This program is cutting costs for manufacturers because . . . it means they can dis-assemble their conveyors for use in other plant locations . . . it means conveyors can be modified in almost any way at minimum cost.

Pre-fabricated sections are available rapidly and inexpensively. Straight sections . . . concave or convex sections . . . take-up charge and discharge-end sections can be furnished to meet specific requirements of belt width as well as load bearing and volume capacities.

*Write today for complete information.*

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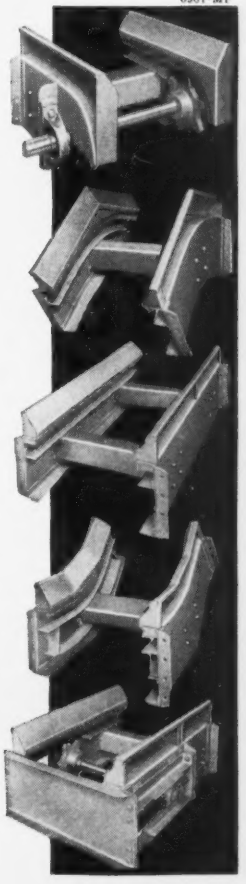
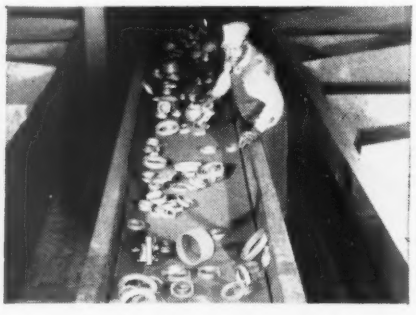
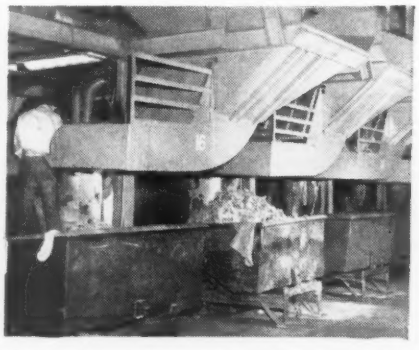


1. Castings come from heat treat to receiving station in furnace trays which are dumped automatically. An inclined conveyor then raises castings to upper level sorting belt.



2. Castings are picked from sorting belt and dropped into segregating hoppers. Any castings missed as they pass their particular segregating stations are recirculated back past the stations automatically. This system is very flexible, since many different castings can be sorted; or the same volume, but with only a few different castings, may be sorted.



3. The sorted castings are carried by gravity from the segregating hoppers to a convenient work level at the grinders. After grinding they are dropped into dump hoppers for distribution.

**Overhead Sorting and Grinding System . . .**

**Engineered by PLANET...**

**Saves Foundry Time, Labor and Space**

This overhead sorting and grinding system was recently designed, engineered and installed by the Planet Corporation.

In operation only a short time at a large midwest malleable iron foundry, it has already proven it will increase production and reduce labor costs.

You can increase the efficiency of your plant with Planet foundry automation. Whatever your specific problem may be, Planet foundry specialists can solve it in a way that will cut your costs. For further information, with no obligation, write or phone today.

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**PLANET CORPORATION**

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LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION


# How Long Should a Firm Retain Business Records?

## *Proper Time Varies, But Here's How To Figure It*

By Robert A. Shiff*

THE records retention problem has no quick and easy solution. An effective schedule is as individual as a prescription for eyeglasses. Experts can work with you to develop a schedule, but they always are dependent on your special knowledge. Some general rules can be suggested, however.

**Developing a Schedule**—Four basic factors should be considered in the light of your own operations and experiences: 1. Legal requirements; 2. Administrative requirements; 3. Historical requirements. 4. Administrative discretion.

*Legal Requirements*—Pay primary attention to what records you must keep for specified lengths of time in order to comply with Federal, state or local requirements. In some instances, certain records should be kept even in the absence of a specific rule because of statutes of limitation. These prescribe the length of time after an action during which legal proceedings can be taken against your company or any of its personnel. Your legal advisers can tell you how long certain types of information must be kept.

Note that it is the information contained on a record that must be kept, not the record as such. The Government usually does not prescribe by title or name the particular form on which the data must be recorded.

*Administrative Requirements*—Your own operating needs comprise another reason why no "canned" schedule can be satisfactory. The schedule you develop must take into account your current practices, not those of another company. There are definite advantages in continuing procedures you have found satisfactory and with which your employees are familiar.

*Historical Requirements*—By analyzing the use to which your records are put, you can tell what records are referred to, by whom and how often. Some records of historical value, particularly those indicating why certain decisions were made or policies adopted, provide valuable future administrative guidance. Only the management of a company knows which records fall into this category and accordingly should be retained

*President, National Records Management Council Inc., New York. This material is taken from No. 70 in the Small Business Administration's *Management Aids for Small Manufacturers.*

# Get to The CORE of your Sand Reclamation Problem

## ..Conventional Foundry Sand
## ..Shell Molding Sand

with a
**NICHOLS**
**Sand Reclamation System**

*Type of core made with Nichols Reclaimed Sand by leading automotive manufacturer*

Only the Nichols Combination Thermal Processing Method is successfully reclaiming all types of used foundry sand. If you are employing conventional foundry sand and expect, in the future, to include shell molding — A Nichols Combination Thermal system *NOW*, will solve your sand reclamation problem PRESENT and FUTURE.

Visit our Booth No. 232, at the 60th Castings Congress, Atlantic City, N. J., May 3 - 9, 1956.

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*Write for Bulletin No. 222*

*This Allis-Chalmers 4,000-lb fork lift truck at a New Jersey plant works fast, drives easily, turns in a 72-in. radius for efficient indoor or yard handling.*

# You can expect <u>double</u> savings with an Allis-Chalmers Lift Truck

## 1 Saves Time and Labor

When you put an Allis-Chalmers Fork Lift Truck on the job, the first thing you'll notice is how fast and steady it works. One reason is the ease of operation. You mount from either side — no brake handle or shifting lever to interfere. The seat is comfortable, visibility is excellent. Handling is "second nature" to even the inexperienced operator, because it drives just like an automobile. Result of this operating ease: bonus quantities of material moved every hour.

## 2 Slices Maintenance Costs to the Bone

"It has gone 6,000 hours and still no downtime." "Up and down a steep ramp for 15 months — repair cost only $1.92." Reports like these are not uncommon, as Allis-Chalmers trucks continue to amaze their owners. When repairs *are* necessary, the truck can be disassembled in 22 minutes — stripped for servicing in 22 seconds. Think what that means in savings.

*Let your Allis-Chalmers material handling dealer show you the kind of savings this lift truck can give you. Write for free catalog.*

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

**ALLIS-CHALMERS**

BH-12B

for possible future reference.

*Administrative Discretion*—Your discretion dictates which records best will satisfy all requirements. For example, the regulations of the Interstate Commerce Commission concerning certain carriers and freight forwarders contain retention clauses for information about property ranging from two years to permanency. In addition, payrolls and material-distribution sheets must be kept permanently, except when the data is transcribed to other permanent records. A whole series of records frequently contains this information—time cards, vouchers, job tickets, payroll worksheets—and it is within management's discretion to designate one or two of these for permanent retention. In this way, much space and equipment can be saved.

Many statutes of limitation also leave room for discretion. In several states, the statute on open accounts is six years. On the basis of your own experience, therefore, you may decide that it will be sufficient to keep vouchers for small sums—say, under $50—for only three years.

**Four Key Questions**—Ask yourself these four questions about every record type for which you want to establish a retention period: 1. What are the legal requirements for this type of information? 2. If there are no formal legal requirements, is there an applicable statute of limitation? 3. If so, how long a period does it state? 4. What would happen if this record were not kept available for reference?

By measuring your records against these yardsticks, you can use facts instead of conjecture to make sensible records decisions. Some organizations are so cautious, for example, that they keep cancelled payroll checks for the "safe" period of 20 years. In reality, legal requirements range from 3 to 6 years. Such firms thus spend money needlessly to store cancelled checks from 14 to 17 years beyond any real need.

**Specific Record Groups**—The following summary of typical record groups includes an explanation of the factors to watch in setting a retention period for each type of record.

*General Accounting*—Journals and ledgers mean different things to different companies. The general ledger, as the basic summary accounting record, usually is retained permanently. The subsidiary journals and ledgers are required only for internal administration and need be retained only through periods of actual use by the accounting department, auditors or top management. Trial balances are working papers that need be retained only through final audit.

*Accounts Payable*—Although cancelled general checks may be re-

Visit Booth 403-405 for your traditional Convention Carnation and meet the men who "expound the virtues" of H-W's Foundry Coke ★ Malleable, Bessemer, Foundry Pig Iron ★ Silvery ★ Shot and Grit ★ Fluorspar ★ Coal ★ Ferro-Phosphorous ★ Spiegeleisen ★ Sands and Clays ★ Fluxes ★Jackets ★ Cupola Gun

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# *There's Famous* CORNELL

## FAMOUS CORNELL IRON CUPOLA FLUX

***For GRAY IRON FOUNDRIES and Malleable Foundries with Cupolas***

***A Few Distinct Advantages:***

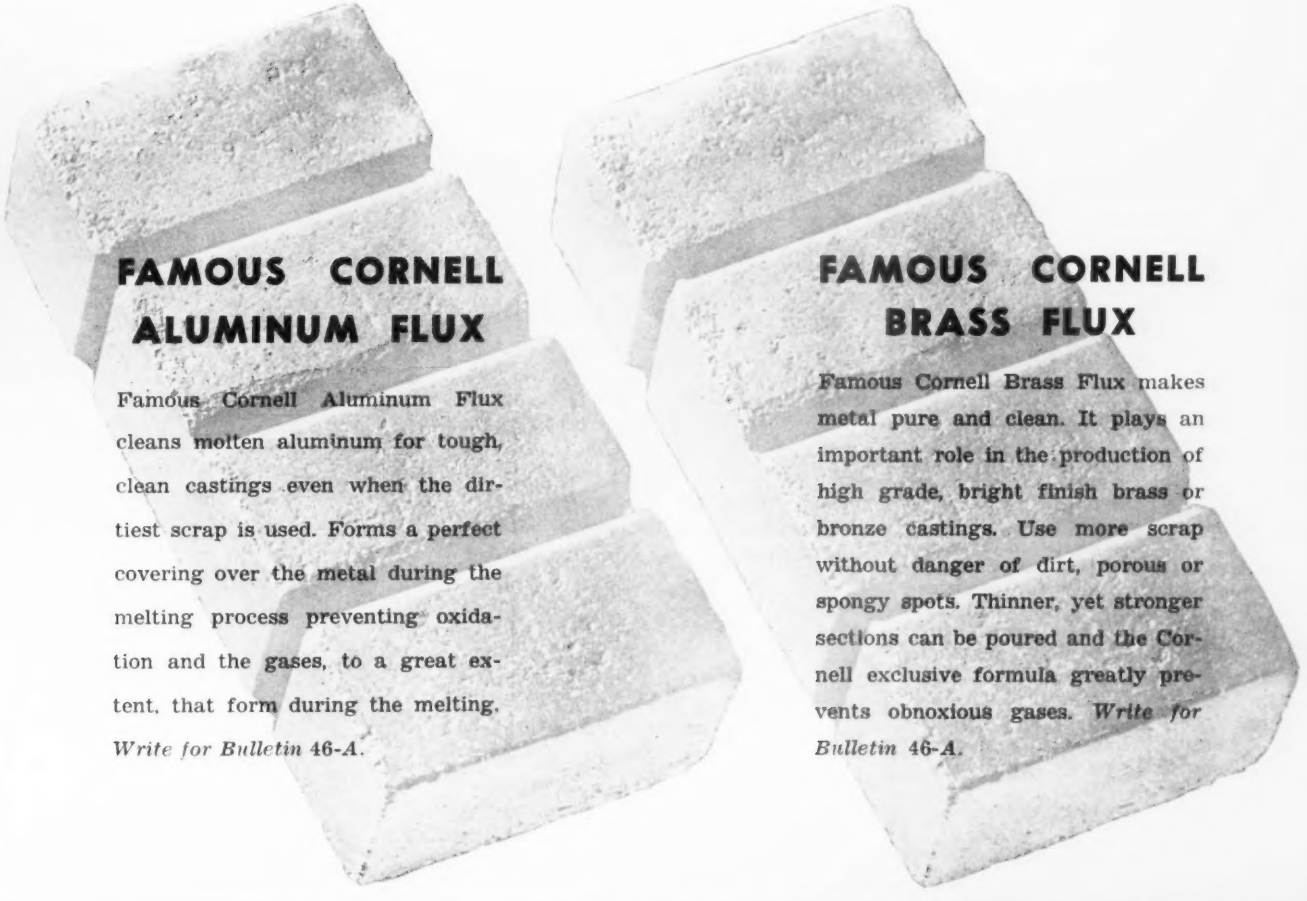
▸ Cleaner Metal ▸ Greater Fluidity ▸ Controlled Melting ▸ Better Machinability ▸ Better Metal Composition ▸ Higher Tensiles ▸ Uniformity of Hardness ▸ Better Graphite Distribution ▸ Carbon Constant ▸ Minimized Rejects ▸ Reduced Sulphur

Excellent results have been obtained when Famous Cornell Cupola Flux has been used in ductile and nodular melting operations. Write for details.

# FLUX in Your Future!

As every foundryman knows a fluidizer is a MUST in any foundry that prides itself on clean metal. That's why so many foundries insist on Famous Cornell, the metal-purifying flux that eliminates foreign matter from molten iron by increasing slag flow off. Once you've used Famous Cornell Flux, you'll be amazed at the improved tensile strength of your castings—at how well they look—at how easy they machine. In addition, Famous Cornell Flux reduces patching down time by imparting a protective glazed surface on cupola linings.

*Write for Bulletin* 46-*B*.



## FAMOUS CORNELL ALUMINUM FLUX

Famous Cornell Aluminum Flux cleans molten aluminum for tough, clean castings even when the dirtiest scrap is used. Forms a perfect covering over the metal during the melting process preventing oxidation and the gases, to a great extent, that form during the melting. *Write for Bulletin* 46-*A*.

## FAMOUS CORNELL BRASS FLUX

Famous Cornell Brass Flux makes metal pure and clean. It plays an important role in the production of high grade, bright finish brass or bronze castings. Use more scrap without danger of dirt, porous or spongy spots. Thinner, yet stronger sections can be poured and the Cornell exclusive formula greatly prevents obnoxious gases. *Write for Bulletin* 46-*A*.

**The CLEVELAND FLUX Company**

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*Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918*

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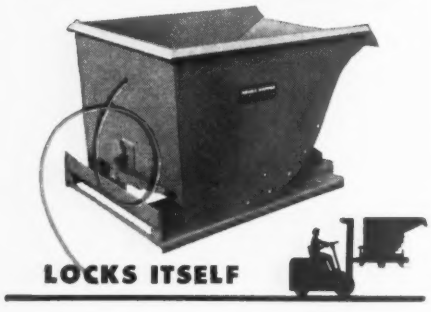


**pays for itself!**

It's the safe, sensible, economical way to handle wet or dry, hot or cold bulky materials. Simple, one-man operation does the job with amazing speed . . . *cuts cost of hand unloading by at least 50%.*

This rugged Roura Self-Dumping Hopper is built to withstand the terrific knocks and bangs of rough usage. Extra heavy gauge metal and welded construction mean years of dependable service. Fits any standard fork or platform lift truck. Also available mounted on live skids or with malleable or rubber tired casters. Sizes from ½ to 2 cubic yards. Thousands in use in America's biggest industries.

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**HOPPER**

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**ROURA IRON WORKS, INC.**
1421 Woodland Ave., Detroit 11, Michigan


tained for the number of years defined in each state's statute of limitations (the average is six years), some companies keep payroll checks for only two years. Cancelled payroll checks can create a volume problem. The greatest activity is in the first few weeks after issuance and usually falls to nothing after one year.

Vouchers always are a bulk problem. Rather than keep them all for 6 to 20 years, you can differentiate between plant vouchers (retained permanently), operating vouchers (retained for an average of six years) and petty cash vouchers (retained for an average of one to two years). These times apply to originals only. Further differentiation might be made by dollar value. It pays to limit retaining copies of vouchers for a minimum number of weeks or months.

*Accounts Receivable*—Management's chief concern in this area is with the unpaid invoices. Paid invoices—particularly large-volume, small-dollar-value items—often may be disposed of within six months to two years. Most complaints on payment or amount of payment are received within this period.

Equally important is minimum retention of any invoice files that duplicate the basic record (arranged by customer or by invoice number). Only those invoices connected with items of new design or the first item of a patentable product requires indefinite retention.

The accounts receivable ledger, as a basic summary of credit sales, need be kept only so long as it is a ready index to invoices or total daily sales. Where there is no other summary of sales, it may be useful to retain it indefinitely for historical purposes.

*Legal Material*—Copyrights, patents and trademarks usually are retained permanently. Contracts more often are kept for six years after expiration, but when renewed annually generally are kept for shorter periods. Records on lawsuits typically are kept for six to ten years after settlement. Bulky work papers and routine notes connected with contracts and suits should be cleaned out as soon as the matter is completed legally.

*Payroll Records*—Basic legal requirements are these: 1. Internal Revenue Service—four years for earnings records (Federal Insurance Contributions Act and Federal unemployment tax); 2. Department of Labor, Wage and Hour Division—three years for payrolls and two years for earnings records; 3. Department of Labor, Division of Public Contracts—four years for wage and hour records. Pension records usually are retained permanently and often may serve as the earnings record as well.

*Personnel*—If a company main-


**FOUNDRYMEN!**

*Be sure to visit*

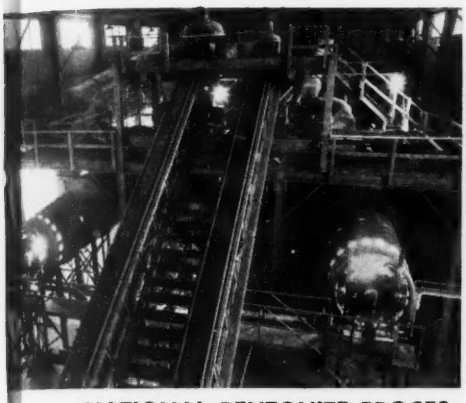
**BOOTH 208**

**NATIONAL BENTONITE**

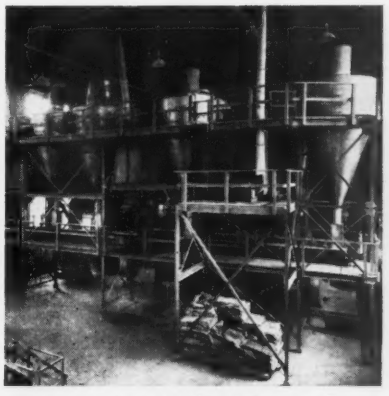
NATIONAL BENTONITE SOURCES in Wyoming are the largest, finest deposits known. Critical exploratory tests . . . cautious

strip-mining . . . and quality checks during production maintain exacting high grade National Bentonite standards. At Col-

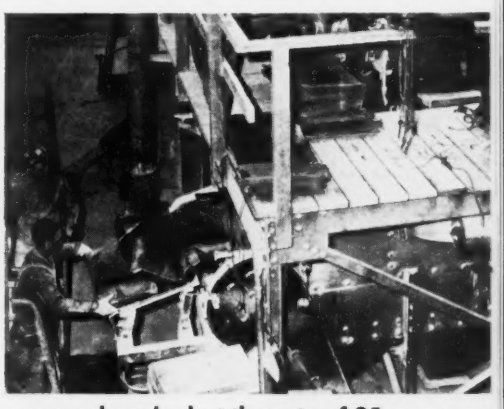
ony and Osage, Wyoming, two-million-bag stockpiles of raw, pure bentonite assure foundrymen steady sources of supply.



NATIONAL BENTONITE PROCESSING begins as raw material enters plant and is scraped into clay slicer. In processing, bentonite is air-dried to 8% moisture

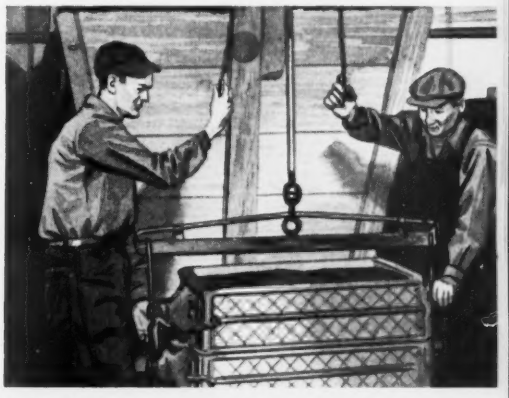


content in 65-foot-long drum driers and ground to powdery fineness, or processed into the various grades of granular bentonite. It is then collected in hop-



pers and packed at the rate of 25 bags per minute. Triple-tested: at plant, after freight shipment, and in warehouse near you — to assure uniform high quality.

NATIONAL BENTONITE IS USED to bond better molds; has high hot strength, permeability and sintering point, few sand problems, needs minimum water for tempering. Foundrymen use it in cores because it dries well, has highest dry strength, con-



tains little gas to vent. Used with ganister to line ladles and melting furnaces, National Bentonite makes linings last longer. It helps produce fine-finished castings of all metals. If you are not now using National Bentonite, test it yourself. Write for sample.

*From the best sources, the best bond —*

# NATIONAL BENTONITE

BAROID DIVISION, NATIONAL LEAD COMPANY, P. O. BOX 1675, HOUSTON 1, TEXAS
Bentonite Sales Office: Railway Exchange Bldg., Chicago 4, Illinois

tains both employee history cards and personnel folders, the history cards may be destroyed within 1 year after termination of employment. An exception to this rule might be the top executive personnel data. Employment applications should be kept only for jobs or persons when the company anticipates action in the near future.

Attendance records, time-clock cards and related data should be handled as a package. When this information is summarized on project or payroll records, the bulky initial records may be discarded within one to six months.

*Production*—Job tickets and production orders really are of value only in processing orders through the factory or when customers raise questions about delivery or quality. These points come up in the initial months after shipping. Actual production orders are the only ones that warrant retention beyond one year. Of all records for one order (job ticket, shipping ticket, bill of lading), only one need be retained in the original. Most information is repeated from one form to the next.

Maintenance records usually are retained for the life of the equipment on which the data is compiled. Monthly operating reports on production are valuable up to two years. Annual operating reports should be kept permanently for historical and management purposes.

*Purchasing*—Purchase orders should be broken down into categories for retention purposes: Major equipment, expendable supplies and materials and the like. Major purchase records, particularly where specifications are included, might be kept for six years. Routine items may be cut to three years and still stay within legal requirements on proof of local purchase and on records of use for tax purposes.

Purchase requisitions need be retained only until the items are received. Receiving reports usually are supporting documents for the accounts payable vouchers and accordingly are retained. Bids are kept after a contract is let out only so long as management wants them for post-audit purposes and so long as purchasing agents may need them as references for the next contract for the same service or items.

*Real Estate*—Deeds, rights-of-way and easements usually are retained permanently; leases are kept for six years after expiration. If leases are renewed annually, they may be kept for only the current year plus one.

*Sales*—Sales correspondence on deliveries, acknowledgments, bids, etc., need be kept only 30 to 60 days at the most, for possible answer and follow-up. Policy letters should be segregated and retained permanently. Customer orders in sales departments are only copies of accounts receivable files and should be kept for minimum periods, if at all.

Salesmen's reports on individual sales and expenses are important only for immediate review. They warrant keeping for only a few months.

*Secretary's Records*—Annual reports, by-laws and minutes of stockholders meetings usually are kept permanently. Cancelled stock certificates are not governed by any Federal legal requirements (except for regulated companies) and may be destroyed at the discretion of the company. Most firms, however, keep a formal certificate of destruction.

*Tax Records*—Regulations on purchase-and-use taxes usually state that a city must announce its intentions to act on a company's returns within three years. There is no limitation, however, in event of fraud. The same holds true for state and Federal returns. Purchase-and-use tax statements usually are retained for three years. Since state and Federal returns are more involved, they are

For
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The CONCENCO® CPC Hydraulic Classifier reconditions foundry sand by removing the fine burnt particles as a slime overflow. At the same time, it sorts the desirable sand grains so that the different sizes may be recombined to produce an entirely satisfactory foundry sand.
This efficient machine operates by hydraulic water power only. There are no moving parts and separations are unusually sharp. Send for complete information.
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The SuperDuty® Concentrating Table reclaims values, particularly non-ferrous metallics from foundry residues and machine shop waste.
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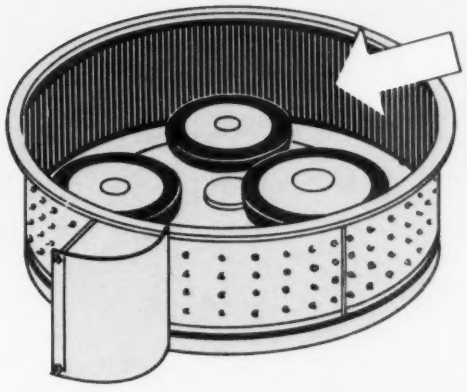
# let the FACTS TALK

# Why make a MYSTERY of foundry sand MULLING?

32.7 p.s.i. (Compared to 31.5 p.s.i.* in the latest slow-speed mixer).

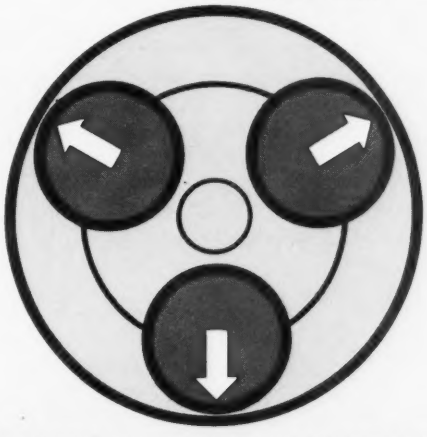


*using the same basis of computation

## 1 It's all a matter of PRESSURE

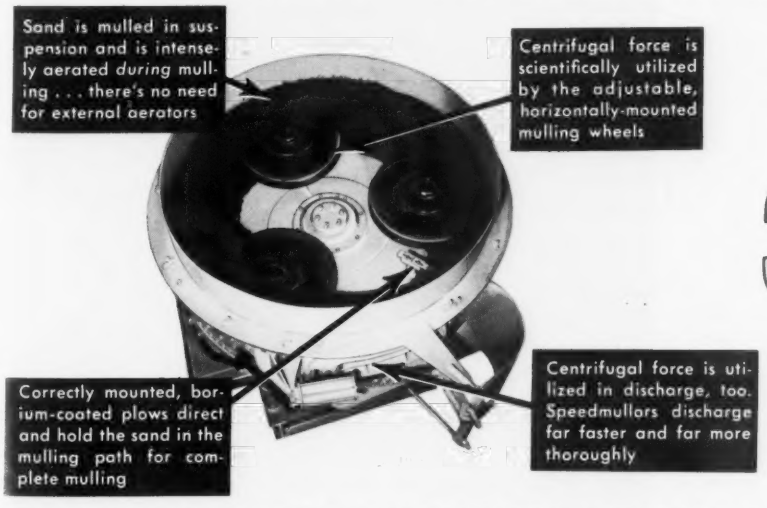
Mulling is simply the application of work energy to a sand mixture to completely distribute bonding materials in a uniform coating around the sand grains. The work is applied in the form of pressure and, in the Speedmullor, this pressure is applied by light-weight, horizontally-mounted, rubber-tired mulling wheels. Utilizing the modern principle of centrifugal force, the wheels of the Model "80" Speedmullor apply 32.7 p.s.i. to the sand as it is mulled in suspension between rubber-tired wheels and rubber-lined bowl. Not only is the mulling pressure greater, but non-slip rubber-to-rubber mulling provides far more effective non-crushing mulling action.

210,000 sq. inches per minute of area covered compared to 78,000 in the latest slow-speed mixer.



## 2 and AREA COVERED

The amount of mulling accomplished depends not only on the pressure but on the amount of sand to which that pressure is applied. The greater the *area* of sand covered, the greater the amount of sand mulled. The three high-speed mulling wheels of the Model "80" Speedmullor cover — by actual measurement — 210,000 sq. inches per minute. By exactly the same basis of measurement, the massive, necessarily slow moving mulling wheels of the latest style slow-speed mixer cover only 78,000 sq. inches per minute. Thus, the Speedmullor wheels apply full mulling pressure over *three times the mulling area* and thus do three times the mulling in any given time period. Since mulling can only be accomplished over the area covered, actual measurement gives the Speedmullor a clear three to one edge.


Sand is mulled in suspension and is intensely aerated *during* mulling . . . there's no need for external aerators
Centrifugal force is scientifically utilized by the adjustable, horizontally-mounted mulling wheels
Correctly mounted, borium-coated plows direct and hold the sand in the mulling path for complete mulling
Centrifugal force is utilized in discharge, too. Speedmullors discharge far faster and far more thoroughly

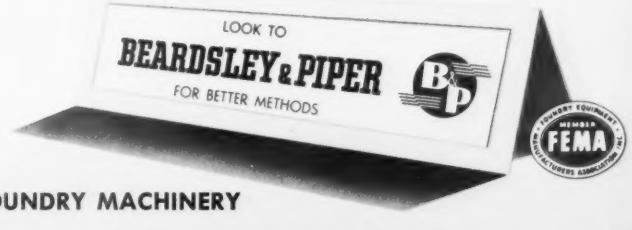
## let the facts talk . . . 3 times the mulling with the SPEEDMULLOR

## 3

This clear superiority of three to one in favor of the Speedmullor means important savings for you. Savings in material are made possible by more thorough mulling. Savings in power costs are made possible by shorter time cycles for complete mulling. Savings in maintenance cost are made because of the lower loads of light-weight moving parts. You save on initial cost, too, because ton for ton on capacity, Speedmullors cost far less, and no expensive external aerators are required.

Use the reader service card in this magazine to request more data or write directly to:

**BEARDSLEY AND PIPER**
DIV. PETTIBONE MULLIKEN CORP.
**2424 N. Cicero Avenue, Chicago 39, Ill.**




**THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FOUNDRY MACHINERY**

# let the FACTS TALK

## there's only one really PORTABLE MULLOR

### 1 ONLY THE SAND NEED BE MOVED ...NOT THE ENTIRE MULLOR

Once the Mulbaro barrow is loaded, it's moved directly to the Mulbaro for mulling and then directly to any point in the foundry. (The Mulbaro's light-weight, rubber-tired mulling barrows are wonderfully convenient for moving mulled sand to molders or coremakers). There's no need to move the entire mulling mechanism as with some so-called "portable" mixers. When you get right down to facts, no one wants to move a heavy mixer around the foundry — and there's really no need. With the Mulbaro, only the sand need be moved.

### 2 SAND IS HANDLED ONLY ONCE ...WHEN LOADING THE BARROW

Loading of the knee-high Mulbaro barrow takes only moments and that's all the sand handling required. There is no loading through a hard-to-reach — waist-high or higher — crib opening. No need to locate the Mulbaro right next to the unprepared sand, either. The Mulbaro can be spotted at the most convenient location and then the easy-to-move barrows are used to bring sand to and from the mullor.

### 3 AND ONLY THE MULBARO OFFERS THE DOUBLED OR TRIPLED CAPACITY OF OPERATION WITH SEVERAL BARROWS

With the Mulbaro, two or more barrows can be used with a single mulling mechanism. There's no need to have the mullor idle for loading or unloading. Capacity can be doubled or tripled at a very small additional cost, and the barrows serve as convenient sand containers for molders or coremakers.

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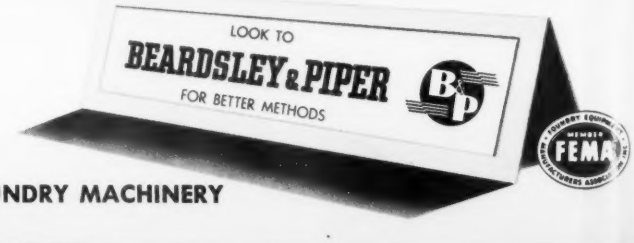



**THE WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FOUNDRY MACHINERY**

kept six years, often permanently. Work papers may be destroyed within the minimum periods.

*Traffic Papers*—The only legal requirements on bills of lading, freight bills and traffic lists is on "order, shipping and billing records"—Department of Labor, Wage and Hour Division—for two years. There rarely is need, however, for more than one official record to cover any one shipment (see also preceding section on *Production*).

**Operating Under a Schedule**—Although the core of a sound record keeping program is an accurate retention schedule, an efficient system also requires the following:

1. Know what records you have and how many of them you have.
2. Learn how much use is made of each record type.
3. Set up a low-cost records center.

## ICI To Hold Spring Meeting In New York May 9-11

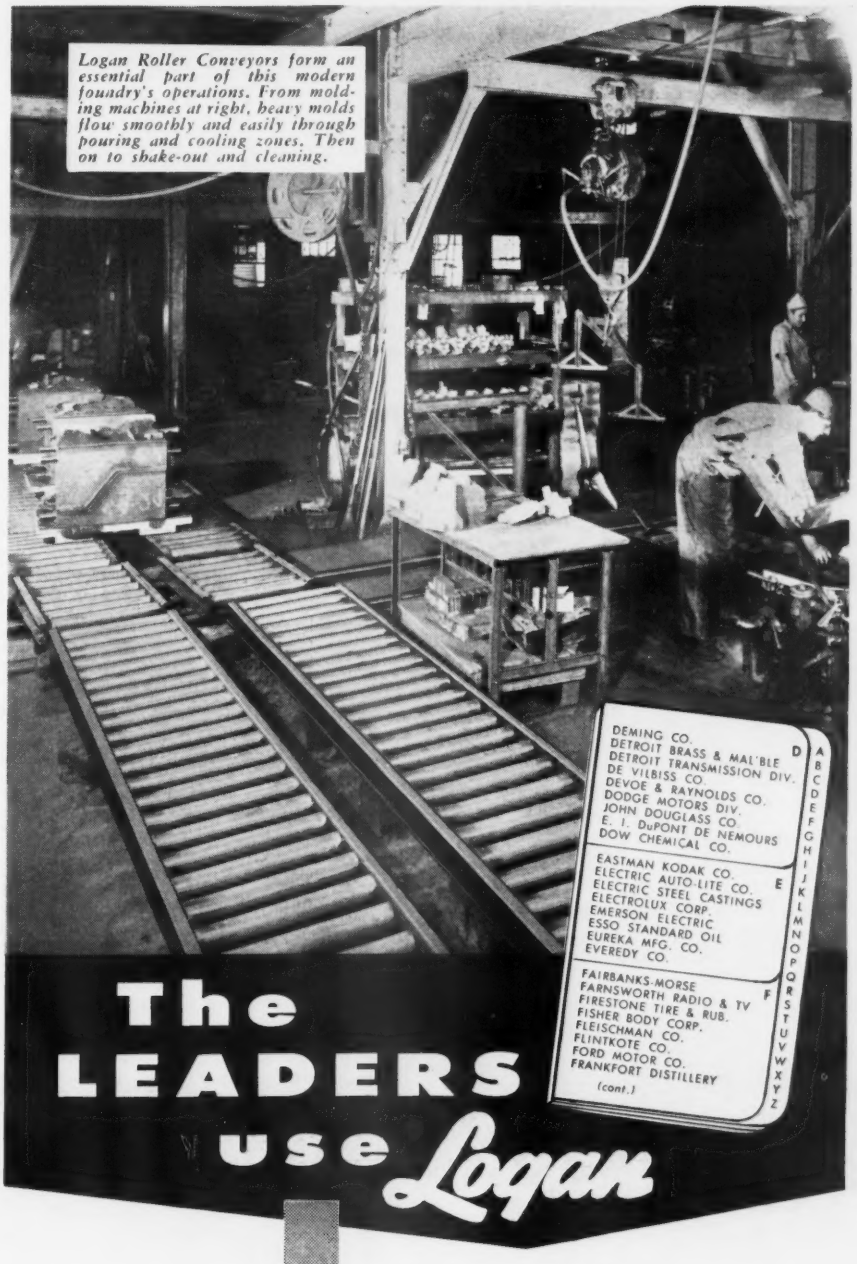
The Investment Casting Institute will hold its spring meeting May 9-11 at Hotel New Yorker, New York. R. S. Banister, Midwest Foundry Co., Coldwater, Mich., is meeting chairman; Geoffrey Paget, Deloro Stellite, Belleville, Ont., is technical session chairman, and H. Lee Scott, Scott Casting & Mfg. Co., Berwyn, Pa., is chairman of the business session.

As in other ICI meetings, the board of directors and technical and administrative committees will meet on the first day.

The second day, May 10, will be devoted to a discussion of technical subjects. The following papers are incuded in the tentative technical program: "Production of High-Strength Steel Castings," by Mr. Paget. Dr. N. J. Grant, Massachusetts Institute of Technology, Cambridge, Mass., will discuss "Decarburization During Casting and Heat Treatment."

A panel of experts will discuss experiments with vacuum melting and details of practical use to the investment caster. Another panel will conduct a question-and-answer clinic on gating problems. Adam Dunlop, Shaw Process Development Corp., will present a special paper on the Shaw process of investment casting. Committee reports will conclude the session.

Final day of the meeting will be devoted to a business session. Management topics to be discussed include: Properties, advantages and limitations of competitive fabricating processes; suggestions for making the best use of advertising; Washington developments important to the investment casting industry, and a review of ICI programs and activities.



Logan Roller Conveyors form an essential part of this modern foundry's operations. From molding machines at right, heavy molds flow smoothly and easily through pouring and cooling zones. Then on to shake-out and cleaning.
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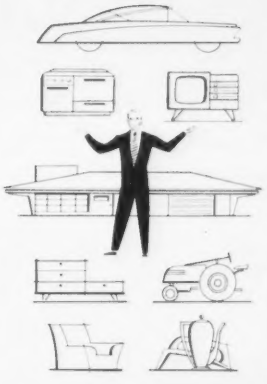
The LEADERS use Logan



"Staying out in front" often is just as difficult as getting there in the first place. That is one of the reasons why America's leading industries depend on Logan Conveyors as an integral part of their productive processes. Speeding output, enlarging capacity, conserving manpower, and decreasing labor turnover are major Logan functions which you, too, can use to advantage. Write for nearest engineer or for further information.

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

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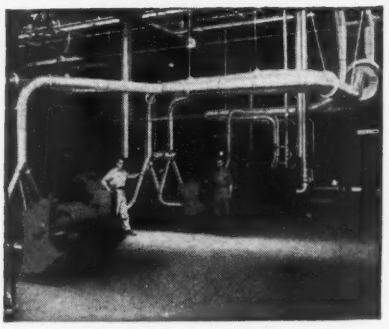
# dust and fumes ... no problem

in famous foundries served by

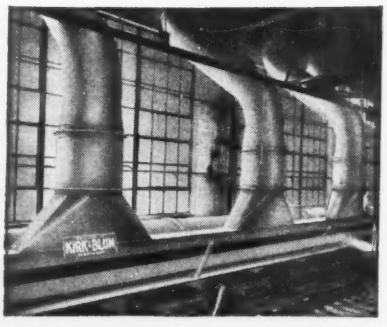
**KIRK & BLUM**

dust and fume control systems



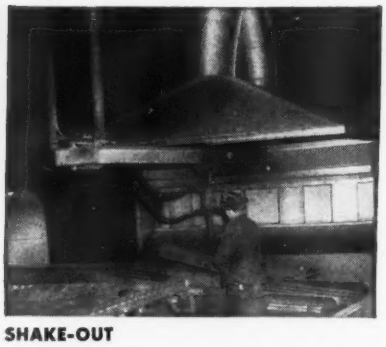
● **GRINDING**

*In the chipping and grinding departments, Kirk & Blum systems control dust; dry collection.*



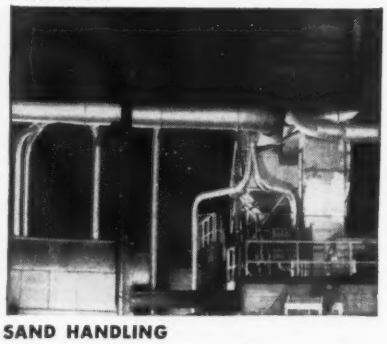
● **POURING**

*"Moving Floor" pouring station. Forty-foot-long Kirk & Blum hood effectively removes fumes as they are formed.*



● **SHAKE-OUT**

*Clean air flows over the shake-out grate, removing dust below the operators' breathing level; wet collection.*



● **SAND HANDLING**

*Equipment is efficiently exhausted by a Kirk & Blum system; wet collection.*

When a "dirty" foundry becomes "clean", important differences soon become apparent in worker efficiency, in maintenance and housekeeping costs, and even in plant-community relations.

If dust or fumes are a problem in your foundry, call on Kirk & Blum for the *complete* job—design, fabrication and installation. From 49 years of experience, Kirk & Blum engineers will be able to show you comparable problems efficiently solved the economical way.

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# SAE Meeting Devoted To Shell Molding Discussion

## *Covers Tolerances, Costs Unusual Jobs, Trends*

SHELL molding was featured in a panel discussion at the Society of Automotive Engineers National Production Meeting and Forum, Statler Hotel, Cleveland, Mar. 19-21. T. W. Curry, director of research, Lynchburg Foundry Co., Lynchburg, Va., was panel leader, with L. E. Wile, research metallurgist, Lynchburg, as panel secretary.

In starting the discussion, R. H. Sutter, president, Sutter Products Co., Dearborn, Mich., spoke of his company's work in developing shell machines for an automotive foundry. He described the newest automatic dump box molding and coreblowing machines, and touched briefly on the use of coated sands.

Ray Olson, general sales manager, Shell Process Inc., Chicopee, Mass., discussed shell molding patterns and their construction. Although close-grained, high-temperature alloy iron is best, aluminum and some bronzes make good patterns, he said. Life of an aluminum pattern is proportional to its density. Pinpoint porosity will reduce, greatly, the life of such a pattern.

He suggested that patternmakers and foundrymen use good horse-sense in designing and writing specifications for patterns. Close tolerances should be confined to critical areas —not to the whole pattern.

### Describes Developmental Work

Manufacturing research and development were covered by W. O. McFatridge, manufacturing research center, International Harvester Co., Chicago. He told of developmental work which led to production of a nodular iron automotive rocker arm with the hole and sides formed by a blown resin-sand core. Sixty-five per cent of those cores are made to a plus tolerance of 0.002-in.; 99.7 per cent are made to 0.021-in. They have a finish of 120-125 rms.

He showed another casting that cost 89 per cent less to make than the forging it replaced.

In conclusion, he said that customers are driving business away from shell molding by asking for unnecessarily close tolerances where they are not required.

H. G. Sieggreen, chemical process engineer, Central Foundry Div., General Motors Corp., Saginaw, Mich., presented case histories on several cast parts. By way of indicating market expectations for shell mold

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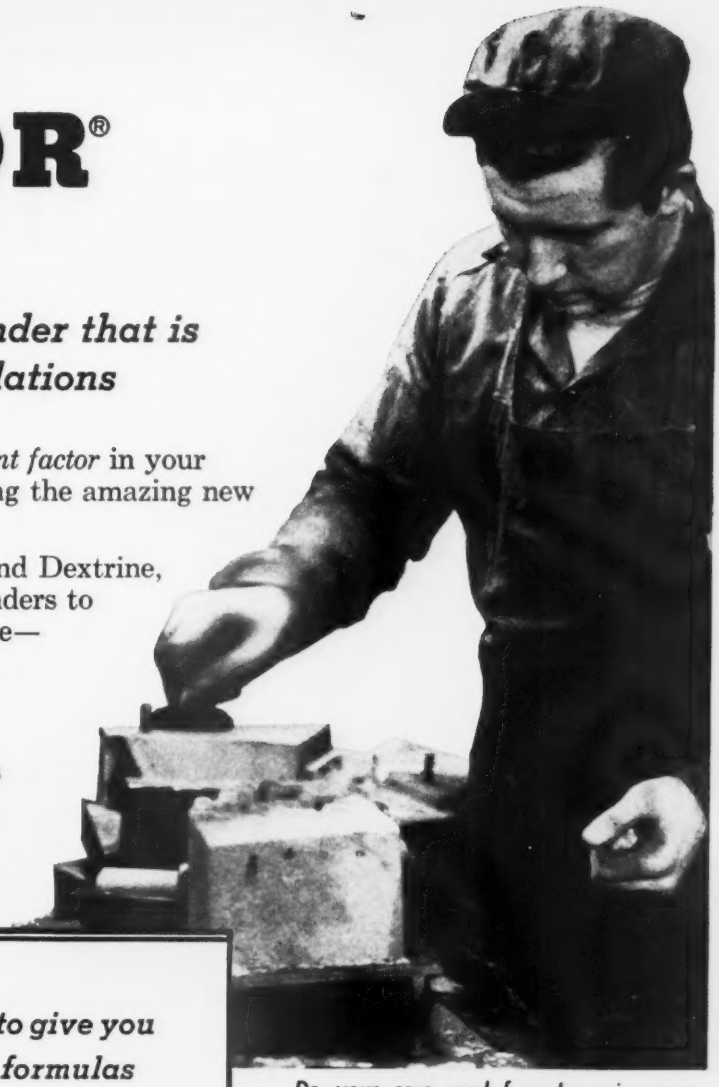

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castings he stated that Central Foundry Division foundries shipped 20,000 tons of gray and pearlitic malleable iron castings in 1955. Shipments are expected to reach 63,000 tons in 1956.

In citing case histories he pointed out that the general characteristics of parts designed for production in shell molds is that they are lighter, have closer tolerances, contain sound metal and require less machining compared with most other types of castings.

Some unusual applications of shell molding were discussed by R. B. Melmoth, Ford Motor Co., Dearborn. He said that the use of automatic molding machines increases the consistency of tolerances. This characteristic is desirable and important for later fixturing in machining operations. Some inaccuracies in shell molded castings are due to misalignment of mold halves at the parting line, softening of shell molds under heat, which causes swells, and the effect of hydrostatic metal head, particularly on soft molds.

### Outlines Corrective Measures

He suggested ways of reducing swells. The span of unattached mold sections can be shortened by applying paste to interior parting surfaces or by bolting such surfaces together. Ribs can be designed onto the backs of shell mold halves to give them greater rigidity. Molds can be backed up with loose materials or solid, contoured metal.

With regard to tolerances he described Ford's production of rocker arms in stacked shell molds. Holes in the arms are held to a plus tolerance of 0.015-in. in castings at the bottom of the stack and 0.006 at top of the stack. Greatest deviation in the castings is 0.026-in.

Other castings produced in shell molds by the usual techniques and weighing ¼ to 12 lb with dimensions across the parting line of 1 to 4 in. showed the following plus tolerances: 0.015-in. average, 0.007-in. minimum and 0.023-in. maximum; 0.013, 0.006 and 0.023-in., respectively, and 0.011, 0.003 and 0.027-in.

T. B. Wilkinson, sales engineer, Monsanto Chemical Co., Springfield, Mass., commented on coated sands and core and mold blowing. He described hot and cold coating methods, saying that hot coating has advantages of short mulling time, high uniformity and good storage life. Disadvantages are high cost due to heating and ventilating equipment required and the need for extremely close control. He added that coated sands offer advantages in resin economy, reduction of pattern lubrication, improved shell density, dust reduction at the molding station and a


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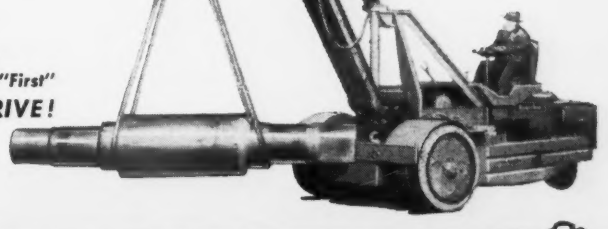

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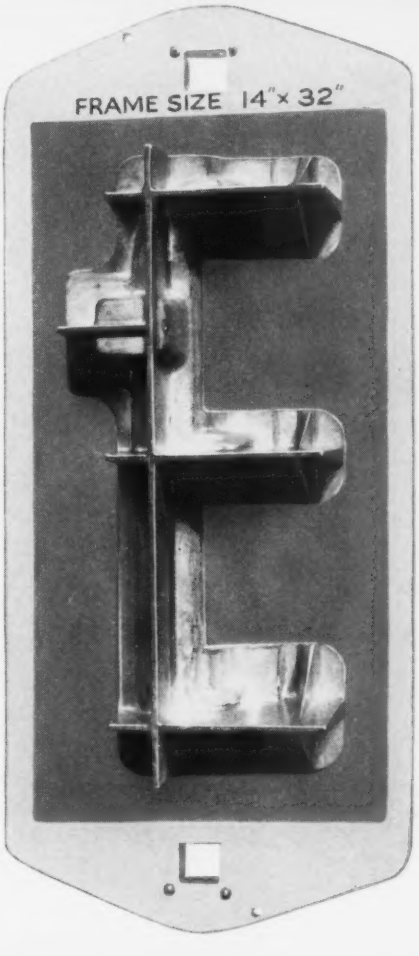


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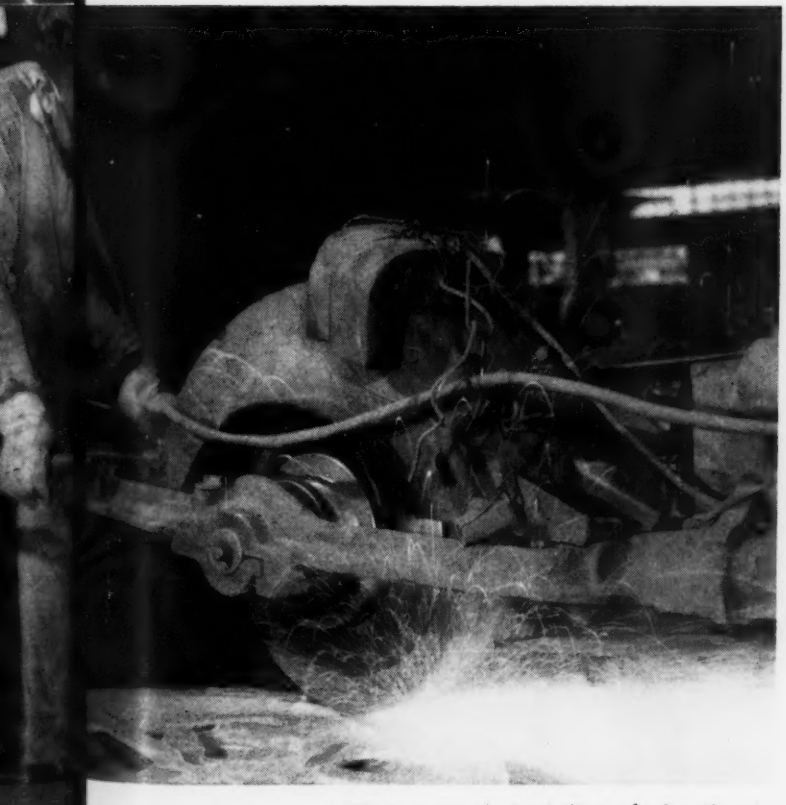

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minimum of organic material in the final product.

Other cost considerations in shell molding are that patterns for dump investment cost less than patterns or boxes for blowing. Blown shells, however, can offer better accuracy and other advantages. The future for blowing is good.

In conclusion, Mr. Wilkinson said that there is little likelihood that the cost of currently used shell molding resin will come down. However, many possibilities exist for development of other type resins which may be cheaper and possess satisfactory characteristics.

E. E. Ensign, president, E. E. Ensign Co., Ypsilanti, Mich., concluded the panel discussion by describing unusual applications of shell molding. An outstanding job now in production is the production of barrel cores for automotive cylinder blocks. Greatest savings are achieved in castings cleaning. The hollow cores do not have to be knocked out and wires or rods removed.

Another job he discussed was the cover for a gun sight. Made as a machined part it cost $60; as a shell casting it cost $11.50.

### Costs Are Unknown

According to Mr. Ensign, many shell molding jobs fail to get into production because the customer does not know existing costs of producing the part. Consequently he is discouraged by what seems to be the high cost of shell molding it.

During the lengthy question-and-answer period it was pointed out that magnesium parts under 1 lb and with section thicknesses no greater than ¼-in. can be shell cast successfully. Satisfactory inhibitors for casting larger parts have not been found.

Regarding tolerances in casting dimensions parallel to the parting line for gray and pearlitic malleable iron, it was stated that plus or minus values of 0.006-in. for 1 in., 0.012-in. for 1 to 2 in., 0.018-in. for 2 to 3 in. and 0.030-in. for 3 to 8 in. might be expected.

Carbon steel castings weighing up to 20 lb can be shell molded. Surface finishes, however, will be poor if carbon is below 0.40 per cent. There is no problem with surface finish of alloy steel castings.

A question on pattern temperature brought the comment that temperature can vary up to 50° F on various sections of the pattern with no detrimental effect on the shell.

In a discussion of resins it was pointed out that successful molds have been made with sugar resins, pine stump resins and others. The field is wide open for development of a good, cheap shell molding resin.

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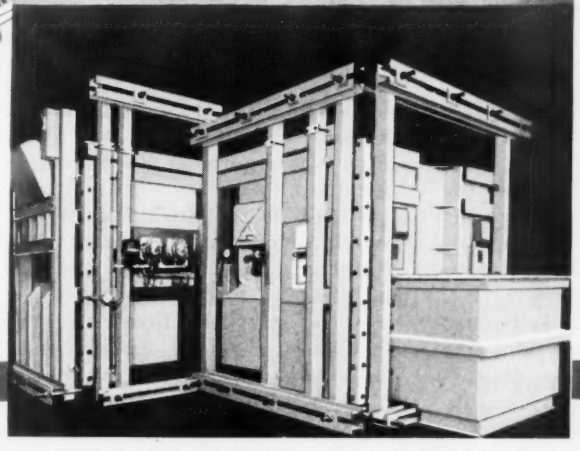

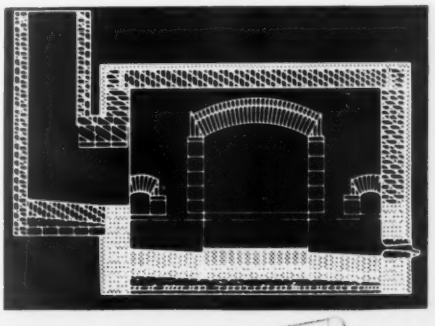

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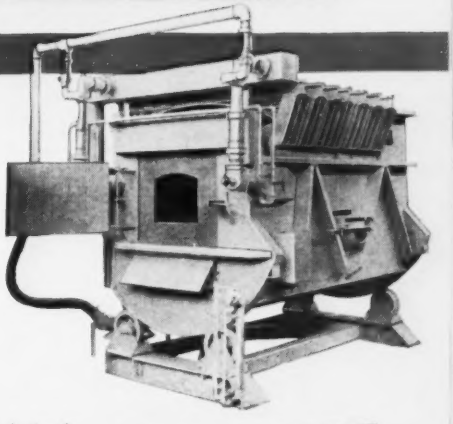

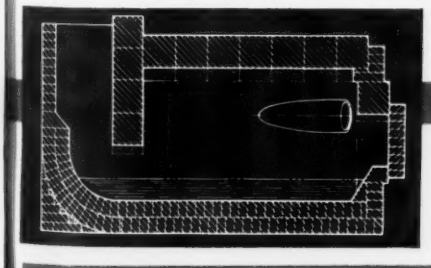

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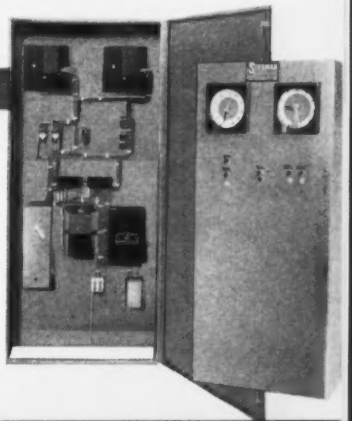

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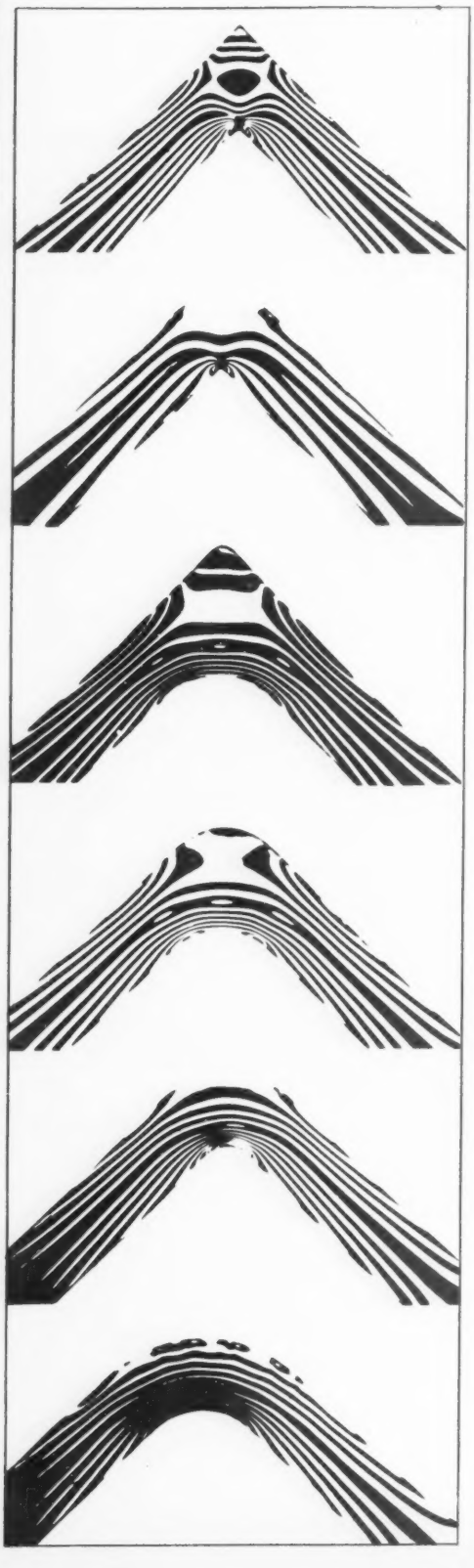
# Steel Foundry Research Foundation Established



Photoelastic studies of steel castings in various combinations of corner radiuses exemplify the type of research which is envisioned by Steel Foundry Research Foundation

INCORPORATION of the Steel Foundry Research Foundation was announced at the 54th annual meeting of the Steel Founders' Society in Chicago on Mar. 19.

This foundation is an Ohio corporation established as a nonprofit organization for scientific and educational purposes. These aims include research in the social and natural sciences as related to the technology, production and distribution of castings made of steel or metal alloys.

In the field of the natural sciences, it is expected that, among other things, the foundation will conduct or sponsor basic research relating to steel and metal alloy castings, seeking to establish physical, metallurgical or chemical properties not now known and to develop such other knowledge as will best serve the public interest by contributing to the needs of America's expanding metallurgical, mechanical and chemical industries, and otherwise.

The foundation also is authorized to pursue studies in industrial safety as related to steel foundries, occupational diseases, industrial hygiene, industrial engineering, personnel relations, managerial techniques and the economic aspects of steel castings production and use.

The articles of incorporation also permit the establishment of fellowships, professorships and other types of support for educational work in all phases of the art and science of producing and improving the production of both steel and alloy castings. The organization of the foundation is a result of recommendations made by a Program Appraisal Committee which surveyed the membership of the Steel Founders' Society of America in 1953 and 1954.

The foundation officers also reported a grant of $55,500 from the Steel Founders' Society of America. This will permit inauguration of research in the technical field which will be guided by the foundation's research director.

Two projects have been selected for this initial activity. The first, "Recommended Practice for the Welding of Steel Castings," is intended to bring up to date the application of recent welding developments to the cast-weld and composite-weld methods of fabrication involving the use of steel castings.

The second project, "Correlation of Destructive Testing of Steel Castings with Stress Analysis and Mechanical Properties," involves the stress analysis and destructive testing of various small commercial steel castings. These same castings will then be redesigned on the basis of the stress analysis and these, in turn, will be subjected to the same test conditions.

### Deductions Will Be Tax-Exempt

It is expected that in due course a ruling will be obtained from the Internal Revenue Service declaring that the foundation is tax-exempt and that contributions made to the foundation by corporations and individuals are deductible for federal income tax purposes to the extent permitted by law.

Offices of the Steel Foundry Research Foundation are located at 606 Terminal Tower Building, Cleveland. Officers and trustees of the foundation are: President, Howard F. Park Jr., vice president—sales, General Steel Castings Corp., Granite City, Ill.; vice president, George W. Myers, president, Crucible Steel Casting Co., Milwaukee; treasurer, R. G. Parks, treasurer, National Malleable & Steel Castings Co., Cleveland; executive vice president, F. Kermit Donaldson, Cleveland; research director, Charles W. Briggs, Cleveland; secretary, George K. Dreher, Cleveland.

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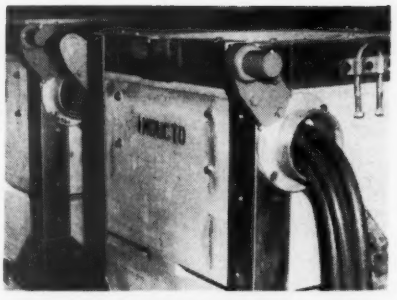

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# What Industrial Workers Can Do for Heat Relief

## *Companies Can Take Some Steps, Employees Others*

By Dr. W. Schweisheimer

EXCESSIVE temperature conditions long have been considered dangerous to health and, therefore, a problem in industrial hygiene. Prof. C. P. Yaglous, Harvard University, developed an "effective temperature index" which combines influences of temperature, humidity and air motion. Drs. J. B. Skinner and W. M. Pierce, Boston, recently made a study of working conditions in a number of plants in which hot processes are employed during the summer. Both of these investigations have yielded pertinent data.

The new data indicate that the problem is of great importance to the metalworking industry, in which heat production from the industrial operations is great in comparison to the heat gain from the sun. In most "dry" processes, the effective temperature does not exceed the permissible limit of 86°F. In wet processes, however, studied conditions were acceptable in only 1 of 12.

**Combating High Temperatures**—Ten methods for combating high temperatures were considered useful by Drs. Skinner and Pierce. They include the following:

1. Extensive use of salt tablets. Most plants use dispensers near drinking fountains. Salting drinking water requires preparation of a 0.1 per cent salt solution. One mechanism involves an electrically operated device for introducing a known amount of salt into a mixing tank.

2. Circulating fans are used to produce cooling air motion. Air movement of 200 fpm results in a drop of 1 or 2 degrees below the "effective temperature" of still air. In one plant, velocities as high as 500 fpm were employed without complaint from workers.

3. General exhaust ventilation can be improved. For localities with effective temperatures of 84°F or lower, considerable heat reduction can be effected.

4. Where the source of heat is concentrated over small areas, local exhaust hoods, properly insulated, are the best possible solution.

5. Instead of exhaust ventilation, it may be desirable to supply air. Such air can be taken from outdoors or cooled by water sprays. Supply air pipes should be installed along

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Get your handfuls to carload requirements of these, the principal foundry alloys of International Nickel Co. and Vanadium Corporation of America. Fifty-eight alloys are "off-the-shelf" items from your nearest Whitehead warehouse. Each of these seven warehouses is well-stocked for prompt delivery with all standard sizes and forms. A call for quotation will convince you our prices are right, too. Take advantage of this easy way to order these quality foundry products.

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# Davenport's
# MOLDING MACHINES
## for Mechanization

*At the Convention: Booths 1945-1947*

## SHOOTERS

HANSBERG

## NOW YOU CAN SHOOT
### Cores and Molds either solid or shell

HANSBERG SHOOTERS operate on a new patented principle which produces a SHOOT rather than a blow. This feature distinguishes them from conventional blowers because the sand is ejected suddenly out of the chamber in a compact mass without erosion of the core boxes or patterns. There are no moving parts in the sand chamber.

RUNG is reduced to a minimum because the filling air does not mix with the sand.

GREEN STRENGTH sand mixtures are used whether they are bonded with COAL, PITCH, SYNTHETIC RESIN, CEREAL, OIL, DRY EXOTHERMIC MATERIALS, SODIUM, or POTASSIUM SILICATES.

The SHOOTING action produces HIGH DENSITY cores and molds.

WOODEN CORE BOXES can be run on these machines without having the finish marred.

ADJUSTMENTS are simple and made quickly. Distance between table and head is instantly changed by operating a valve. Shoot heads are changed by loosening and tightening thumb screws.

HANSBERG SHOOTERS are ruggedly constructed with simple mechanisms to insure low maintenance.

Made in 4 sizes:

- H1—4 lb. capacity
- H5—18 lb. capacity
- H12—43 lb. capacity
- H25—88 lb. capacity

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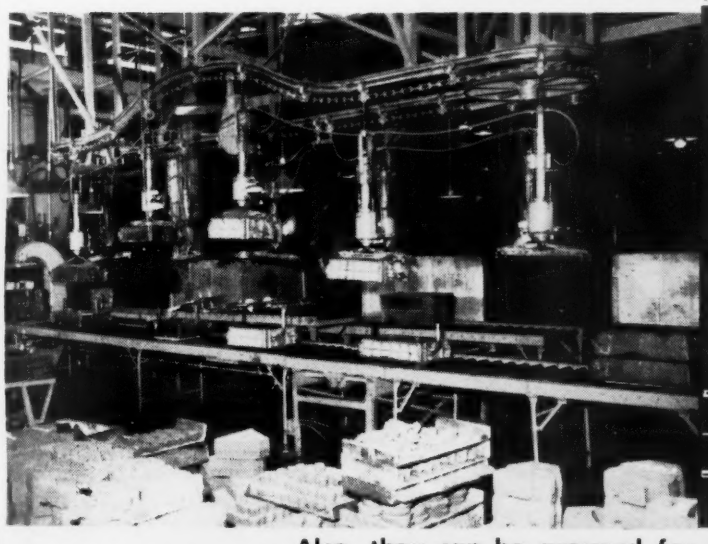
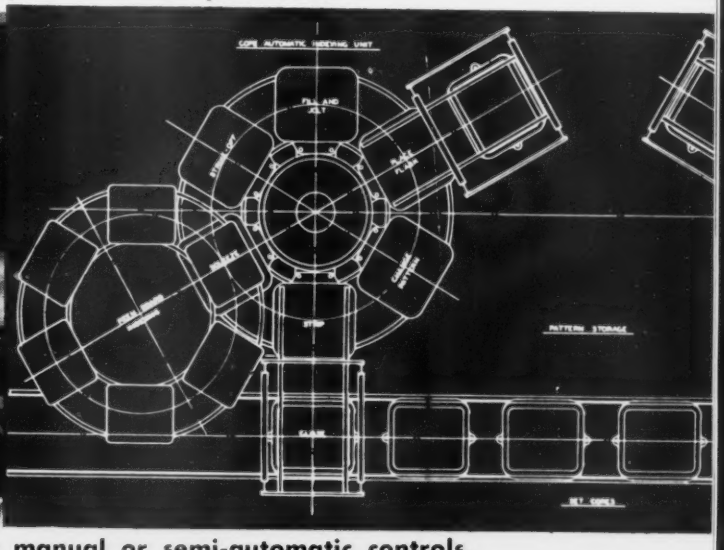
# *for* ADVANCE IDEAS

## *and* Automation

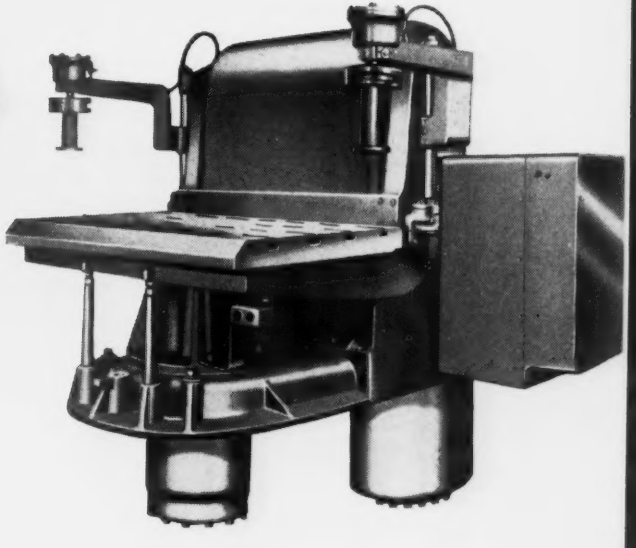
### SIMPLIFIED MACHINES TO PERFORM MOLDING OPERATIONS PROGRESSIVELY

**These machines can be grouped in four (4) or six (6) station units to be controlled automatically for maximum production.**





**Also, they can be grouped for manual or semi-automatic controls. The production from these units will vary with the manning.**



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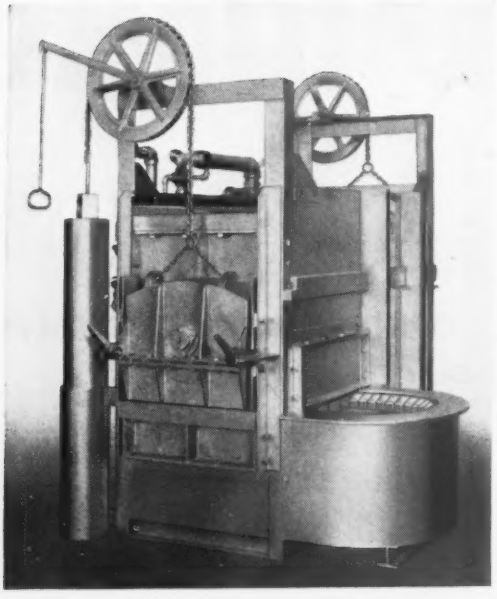
# NEW JOHNSTON REVERBERATORY FURNACES!



★ Available in from 400 to 2,000 pound per hour capacities.

★ All parts exposed to flame or direct radiation are cast iron.

★ Automatic controls in breakdown and holding chambers.

★ Equipped with Johnston nozzle mixing burners.

★ Lined with top quality refractory brick.

★ Advanced design and quality workmanship throughout.

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The latest thing in refractory practice is Method of Application. With a Vibron Recoiless Rammer workers will produce greater density linings and patches with longer life. Result: Major overhauls are eliminated . . . only minor touchups are necessary.

Vibron's Bantam Rammer let's you get into the smallest ladle. Vibron's recoiless Rammer saves worker time and energy on larger job.

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the ceiling of the workroom where they are in contact with the hot test air.

6. To reduce radiant heat, suitable baffles can be installed between high-temperature sources of heat and the workers. A common device is a series of chains placed in charging doors of furnaces. Radiation from furnaces, kilns, driers, etc., can be prevented by proper insulation.

7. From a health standpoint, any enclosed humid process is preferable to an open one.

8. Often, a considerable amount of hot surface can be insulated. Insulation of ventilation ducts for both heating and cooling may be desirable.

9. Working hours may be adjusted to avoid the hotter part of the day. In some plants, employees are permitted to go home at noon on days when the outside temperature rises to over 90°F.

10. Water may be sprayed on the roof to minimize the effect of sun heat gain and to reduce the temperature of air near the ceiling.

**It's the Humidity**—Whoever first said that it's not the heat, but the humidity which causes discomfort knew what he was talking about. The evaporation of moisture from the skin plays an important part in the removal of heat. A combination of high temperature and high humidity is uncomfortable because the humidity prevents both perspiration and its evaporation from the skin and thus does not allow the body to release its heat surplus naturally.

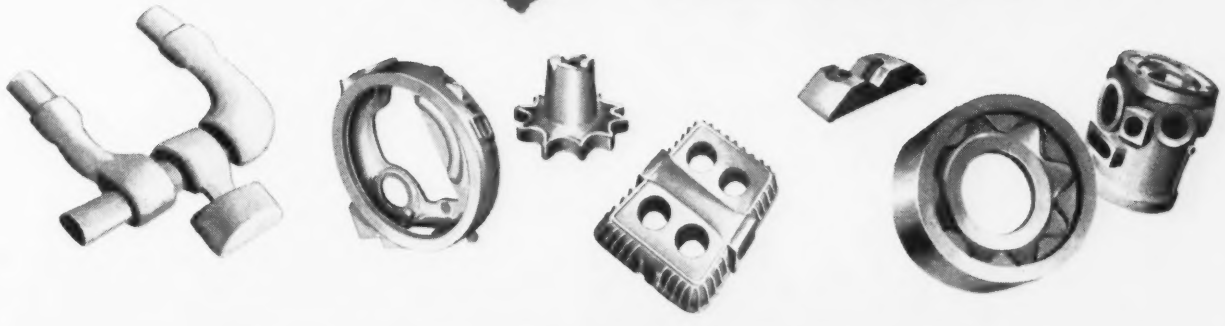
Since profuse sweating takes large amounts of salt from the body, salt tablets are necessary to restore the working capacity. It should be emphasized, however, that replacement of lost liquid by water is vital. Alcoholic beverages are best avoided during hot days; they produce more heat in the body.

Some statistics on the effects of heat should be mentioned. Men are three times more susceptible to heat stroke than women, and infants and the very old also are easier victims. Contrary to a common belief, Negroes are much more susceptible to heat than Caucasians—two to six times more so. Working is more exhausting in the city than in the country on hot days.

The worst period of the day is between 2 and 5 p.m. The second largest number of cases occurs between 7 and 10 p.m. Temperature indoors may continue high in spite of a drop in temperature outside.

In addition to its physical hazards, heat reduces working efficiency. The

# WHAT'S YOUR Sand Recipe FOR MOLDS?



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Serviced by two main trunk railway systems, Ottawa offers fast delivery to all corners of the nation.

**99.89%**
**PURE**

Laboratory tests prove Ottawa Silica 99.89% pure.

Upon the mixture depends the quality of the castings you produce. When all ingredients are right, the pay-off comes in cleaner, smoother foundry products in less time at reduced costs.

With Ottawa Silica Sands you are sure of the most important ingredient for top performing molds and cores. Constant uniformity and purity plus a high permeability factor guarantee steady high quality with every pouring.

And don't forget Ottawa's Flint Shot abrasive, the *round* grain that is so ideal for low cost casting clean-up.

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**SILICA COMPANY**

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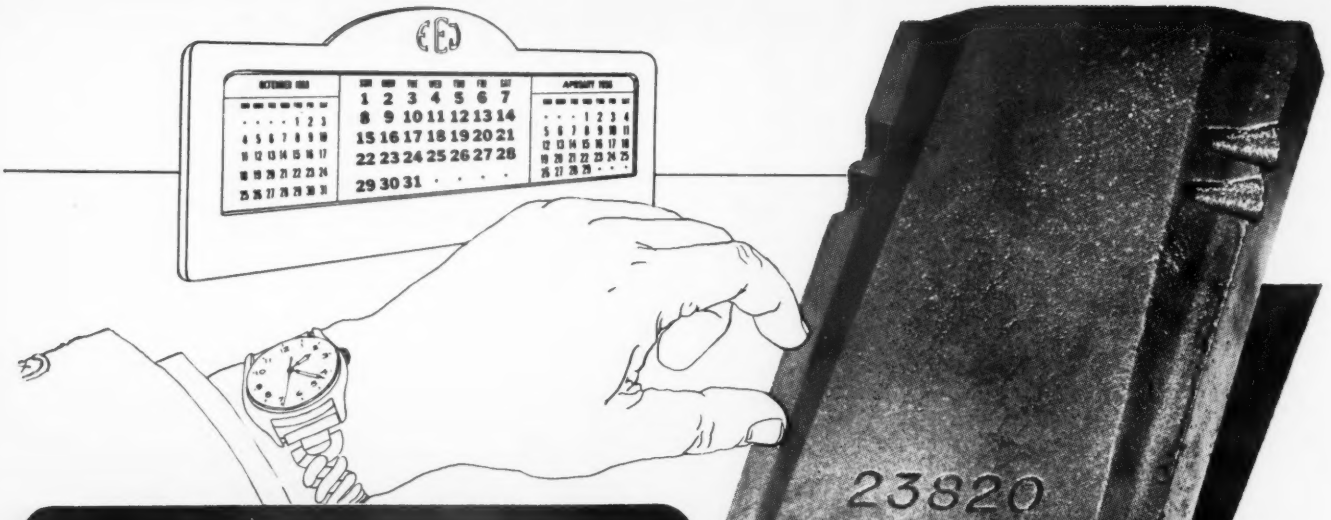


# HOUR or DAY

## ...How Do You Measure the Life of Your BLAST CLEANING BLADES?

The longer the productive interval between blade replacements in blast cleaning machines, the greater is the operating profit. TISCO Replacement Blades for Wheelabrators* have unusually long life. Taylor-Wharton, noted for extensive research, development and production of wear-resistant alloys has developed a material that is outstandingly resistant to the kind of abrasion to which blast cleaning blades are subject. TISCO Replacement Blades are known to give up to five times the life of other blades in durability and output between replacements. The net result is an appreciable saving in blast cleaning costs.

TISCO Long Life Replacement Blades are heat-treated and oil-quenched to a Brinell Hardness of at least 700. All fitting dimensions are accurately ground and wearing surfaces have maximum smoothness. TISCO Replacement Blades are balanced in sets. Order them from your local dealer. If he does not handle them, get in touch with us.

*Reg. U. S. Pat. Off. by Wheelabrator Corp.

TISCO Long Life Replacement Blades are carried by foundry dealers throughout the United States and Canada.

TW

# TAYLOR-WHARTON DIVISION

HARRISBURG STEEL CORPORATION

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ordinary feelings of lack of energy and drowsiness due to hot weather are reflected in diminished output and decreased efficiency. Extreme effects include heat cramps, exhaustion and heat stroke.

Observations by one group of investigators on workers exposed to industrial heat exhaustion showed that rest, food and water were sufficient to restore all men so that they even could continue to work in the heat for hours. It was concluded that heat exhaustion and the ability to work in heat are dependent almost wholly on the functions of the heart and the blood vessels. Moderate intake of salt and plenty of water are necessary to keep these functions intact.

**How To Keep Cool**—Light, easily digested food in moderate amounts helps to keep body temperature down on hot days. Fruits, vegetables and salads, with only a little fat (butter, lard), are appropriate during a heat wave. Protein-containing foods—meat, eggs, cheese, vegetables, etc.—are preferable to carbohydrates—bread, sugar, rice, potatoes, etc. Workers who must exert themselves physically on hot days need their normal three meals. Adequate sleep also is important.

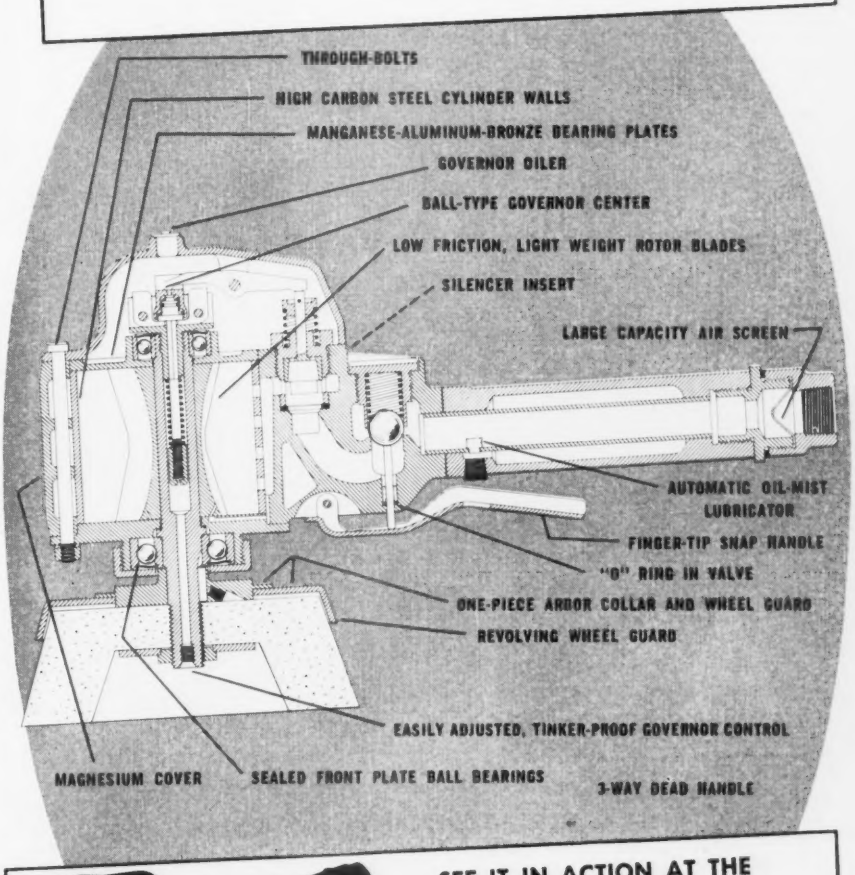
Loose, thin, nonconstricting clothing is wise. It should be open at the neck both during and after work, to permit escape of body vapors. White and yellow clothes are best because they reflect rays of the sun. Some persons feel refreshed after a warm bath or shower during the hottest part of the day, followed by a drink of hot tea or lemonade. Both measures tend to open the pores of the skin so that heat can be given off rapidly. Most persons, however, prefer cold showers and cold drinks. Holding the wrists under running cold water is refreshing temporarily.

To avoid unnecessary discomfort from heat, one should stay placid. Any mental excitement or physical agitation speeds up circulation of the blood and produces supplementary heat. An interesting job helps to overcome the thought of heat and its effects. The less a persons thinks about the heat, the less it bothers him.

## Firm Changes Name

Trundle Consultants Inc. is the new name of the former Trundle Engineering Co., Cleveland. The change was made to reflect the firm's broad area of service to management. Trundle also has branches in Chicago and New York.


Cleco's new 2000 Series Grinder
challenges you to cut grinding costs

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**LIGHTEST, MOST POWERFUL IN ITS CLASS.** Cleco's Model 2000 Grinder assures safer, longer-lasting, more economical operation. We invite you to test this new tool on your air line against any other in its class. Contact us for a demonstration.

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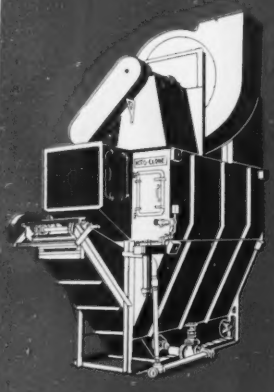
6112

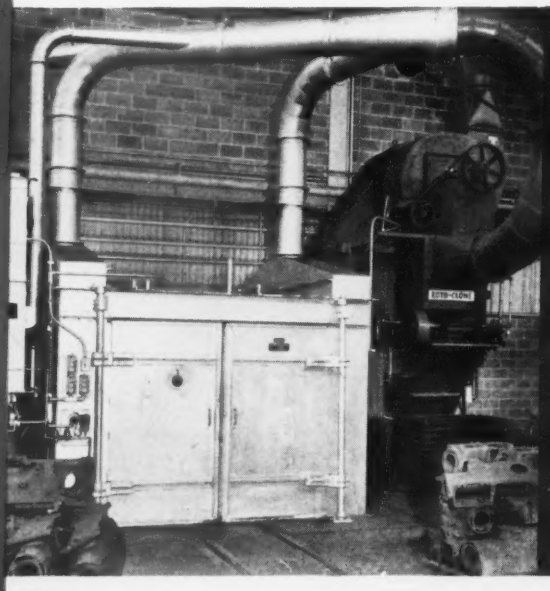
*Better Air Is Our Business*

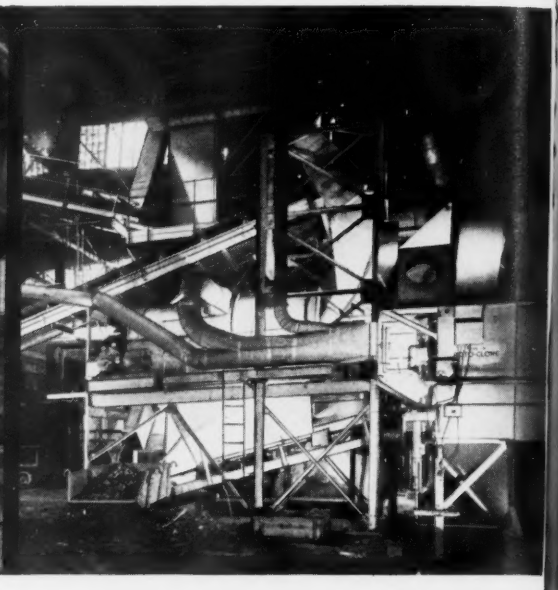
Type N ROTO-CLONE



ABRASIVE CLEANING, SAND HANDLING

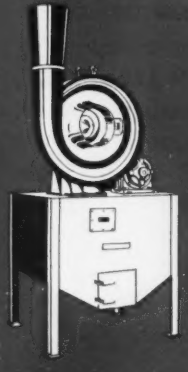
The Type N ROTO-CLONE is widely used for exhausting both abrasive cleaning (below left) and sand handling operations. High cleaning efficiency of this hydrostatic precipitator results from the combined action of centrifugal force and the thorough intermixing of water and dust-laden air. Automatic sludge ejector provides for easy disposal of collected material. Bulletin 272.





# AAF fights foundry

GRINDING



Type D ROTO-CLONE

The usual recommendation for snag, portable and swing frame grinding dust is the Type D ROTO-CLONE which combines exhauster and separator in a compact, self-contained unit. It draws in the dust-laden air, delivers the collected material to the storage hopper and expels the cleaned air —all in a single operation with only one moving part: the impeller. Bulletin 272.

High efficiency, low cost and small space requirements make AAF's Type W ROTO-CLONE a favorite for shakeout operations. Water sprays extend the effectiveness of the dynamic forces to the collection of the lightest and finest dust particles. Requires little maintenance, uses a minimum of water and maintains efficiency regardless of variation in air volume. Bulletin 274.

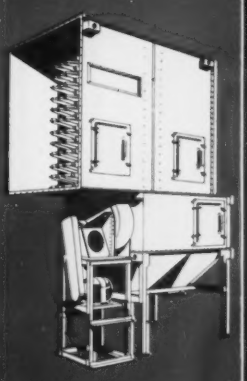
AMERjet

ELECTRIC MELTING FURNACE

The AMERjet Fabric Dust Arrester is recommended for metallic fumes from electric melting furnaces. Reverse jet principle allows velocities through the cleaning media up to 5 times greater than ordinary fabric collectors. Constant air volume is assured by constant, automatic and continuous reconditioning of cleaning tubes. Bulletin 279.

AAF's AMERclone dry centrifugal, originally designed for boiler fly ash, is the answer to cupola stack gases. Not a cinder-catcher, the AMERclone traps the fine particles that often settle on parking lots and surrounding neighborhoods. One AMERclone handles two cupolas alternately, assuring full-time utilization of equipment. Bulletin 291.

AMERclone



CUPOLA

# y dust on all fronts

## Where is process dust causing you trouble?

**GRINDING? SHAKEOUTS?**
**ABRASIVE CLEANING? CUPOLAS?**
**SAND HANDLING? MELTING FURNACE?**

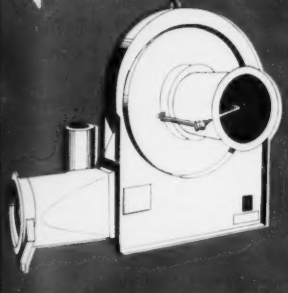
Only a complete line of versatile dust control equipment can successfully fight the plant-wide battle against foundry dust. And the world's most complete line is AAF. It includes hydrostatic precipitators, dynamic precipitators, dry centrifugals and fabric arresters.

AAF's 20 years experience in foundry dust control assures the right unit for every dust-producing operation, regardless of type of dust or concentration. Every product in the line, what's more, offers the basic design features you expect from AAF:

- **Small space requirements**
- **Maintained performance over a wide range of operating conditions**
- **Constant exhaust volumes**
- **High collection efficiency**

Here they are—AAF's "stable of champions" for foundry dust control. One of them will answer *your* dust problem. For more information on any or all, call your local AAF representative or write direct.

SHAKEOUTS



Type W ROTO-CLONE

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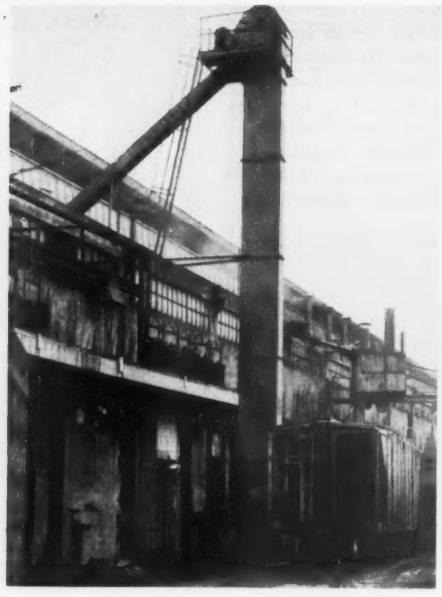
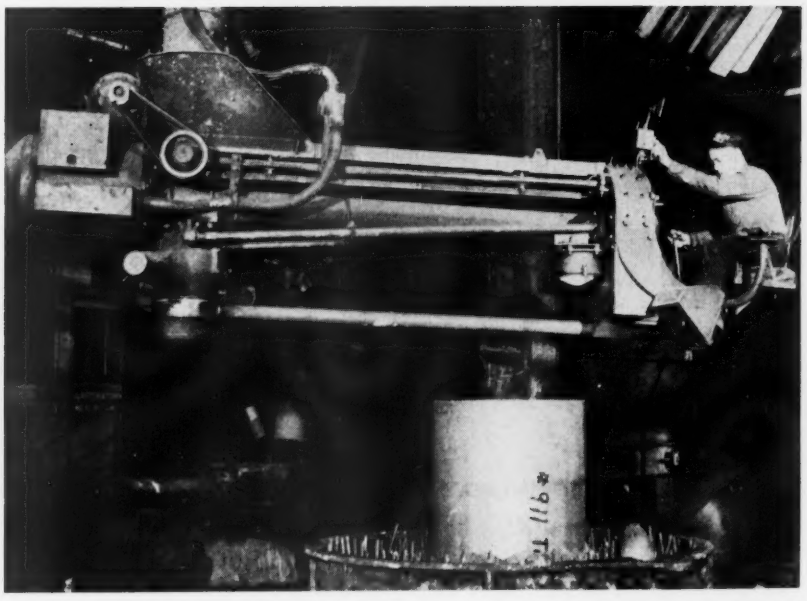
**VISIT AAF EXHIBIT at the FOUNDRY SHOW booths 1309-1311**

See models of all of these dust control units plus a detailed model of AMERclone system with actual cupola installation operating data.



Incoming sand is transported to storage bins by bucket elevator



Mobile sandslinger is used to ram heavy molds. It loads conditioned sand from a conveyor system and operates on a track the length of the main bay

# Pacific Northwest Foundry Marks 75 Years of Progress

By DEWAR FORBES

ONE of the oldest foundries in the Pacific Northwest is Washington Iron Works, Seattle, Wash. It was begun in 1881 by the late John M. Frink, and Mr. Frink's sons and grandsons have continued to expand the foundry and its products.

The company began as a small foundry for production of maintenance castings, and a machine shop later was added which has been expanded through the years. Every new machine tool for precision workmanship has been utilized.

Today, Washington Iron Works is a recognized leader in providing finished machinery for such major industries as paper and pulp, logging, mining, fishing, shipbuilding, etc. It also manufactures complete diesel engines, for marine propulsion, ranging from 90 to 1000 hp; hydraulic presses of all kinds; cranes; hoists; and cable ways. In addition, the company is prepared to tackle any custom job in its design engineering department.

Many employees have been with the company for years. Every convenience is provided for their comfort and safety, including a dispensary and first aid station with a registered nurse in attendance. These employees number around 500, of whom 150 work in the foundry and the pattern shop.

The foundry building is 125 x 400 ft, with a chipping, cleaning and sand blast wing 70 x 100 ft. The pattern-shop building, adjacent to the foundry, is 75 x 160 ft.

In the foundry various types of castings are made of special process iron and of both carbon and alloy steel. Metallurgical control from the centrally located laboratory assures accuracy and quality in alloying the melt and testing finished castings. The laboratory not only handles chemical and physical analysis of castings, but also tests core and molding sands.

Heat treating equipment consists of three oil-fired furnaces, with water and oil quenching tanks. Steel furnace melting equipment consists of two basic-lined electric furnaces with a combined melting capacity of about 17,000 lb. Iron melting equipment consists of two cupolas, one lined to 46 in. and the other one lined to 68 in.

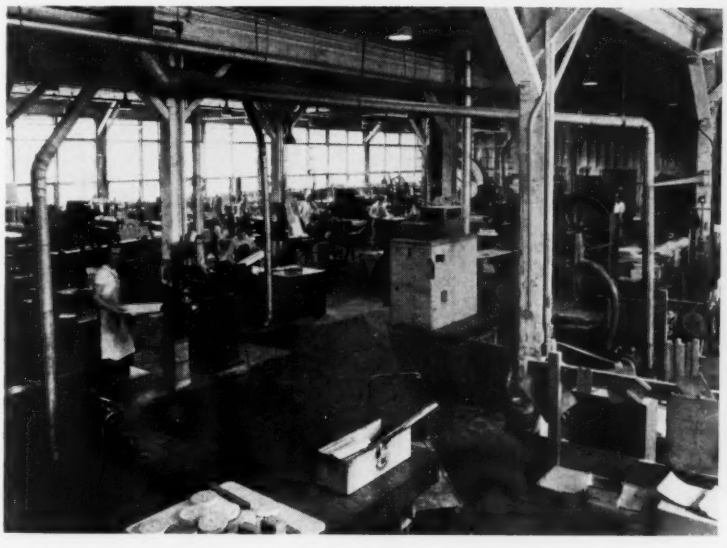
Sand for both steel and gray iron foundries is received in closed-hopper, bottom-discharge cars and is discharged into a screw conveyor system beneath the track. This system moves it to a bucket elevator which discharges it into elevated bins. A 70-ton carload of sand is discharged and conveyed to bins in less than one hour.

Sand for the coreroom comes from overhead bins which feed by gravity to the muller.

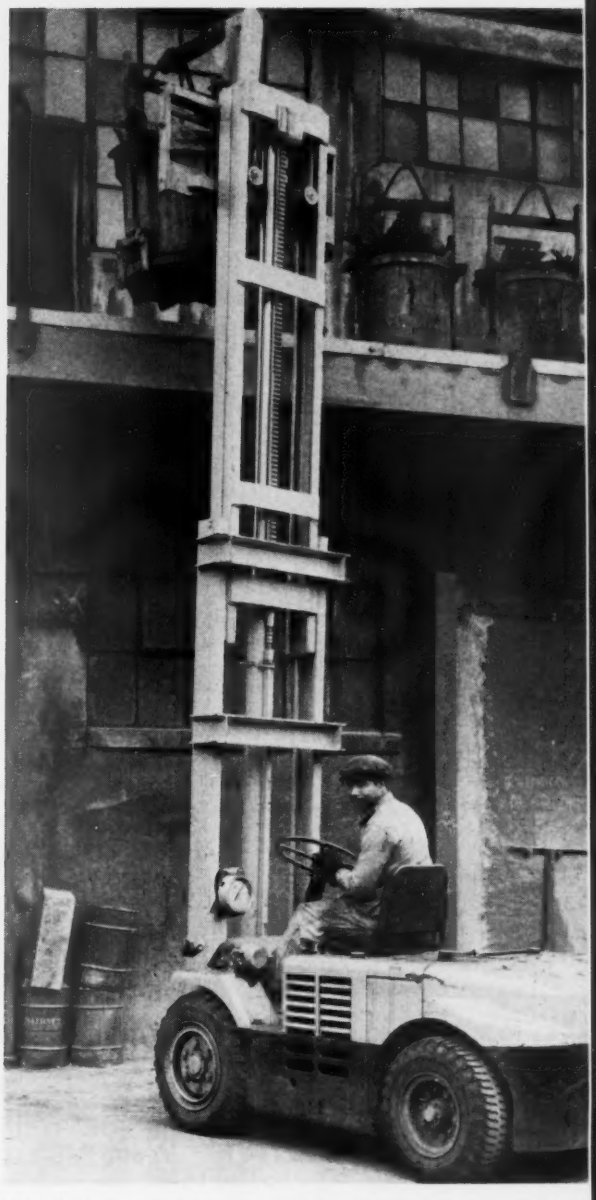
Molding sand is conditioned by a system with a surge capacity of 75 tons per hour. Spent sand flows from the shakeout grid through vibration pans to a conveyor belt, which elevates the sand to overhead bins. Before it reaches the overhead bin, the sand passes through a revolving screen for refuse removal and then through a pneumatic fines manifold, in which fines are removed. The system is equipped with a complete exhausting system which removes fines and dust and discharges them into a wet dust collector. Mud discharged from this collector goes into steel tubs, which are trucked to a dump and emptied.

Sand in the overhead bins can be cooled by a recirculation conveyor circuit. This sand also flows by gravity from the overhead bins to a muller, in which measured amounts of water, bentonite, fire clay, silica flour and other materials are added. The sand then is mulled, discharged by gravity to a conveyor belt on

View down main bay of the foundry, which is 125 by 400 ft. Wing for chipping, cleaning and sand blasting is 70 by 100



View of the company's modern pattern shop. It is located in a 75 by 160-ft building which is adjacent to the foundry



Weighed and numbered cupola charges are moved by lift trucks to an outside hanging platform

which it flows to an aerator, then is transported by belt throughout the foundry to overhead sand bins. This sand is used successfully for both iron and steel production, and accurate control of both molding and facing sands is maintained to provide uniform results.

A complete sand control system is maintained and operated in the laboratory, which checks many times a day on various batches of sand. In addition to all the equipment for measuring green strength, permeability, compression strength, moisture, etc., a laboratory muller and a core oven are operated constantly to improve sand mixes.

In addition to the sand conditioning equipment, the foundry operates a dry reclamation system which consists of a pneumatic air scrubber with its accessories and a dry-bag type dust collector. This scrubber operates at about 2 tons per hour for reclaimed sand for cores. When reclaimed sand is used for molding sand, the capacity can be increased. The scrubber is located adjacent to and tied into the sand conditioning system.

A mobile sandslinger, which loads from a conveyor system with conditioned sand, operates on a track running along the side of the operating length of the main bay of the foundry and is used for ramming all heavy molds.

The core oven department consists of four car-type ovens, three about 8 x 16 ft and one 13 x 16 ft. All are equipped with natural gas and/or oil heating equipment which has automatic temperature controls. The recirculating type ovens provide constant and equal temperatures at any

Cupola is charged by same man who makes up charges and conveys them to the outside hanging platform

# NEVILLE PIG IRON

IF you're a jobbing foundry man, we don't have to tell you about the great variety of gray iron castings you produce in your shop. All you have to do is leaf through your production schedules for the past six months for a reminder of the great diversity of sizes, patterns and analyses which you cast to specification.

The point is this: Because we not only produce but *stock* Neville Pig Iron in a wide variety of analyses, we feel we can help simplify your pig iron supply problem considerably. We can ship Neville Pig Iron in virtually any analysis and quantity you may need . . . and on schedule!

We'd like to talk over your specific pig iron requirements . . . and offer you our technical assistance without obligation. *Write or call today.*

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point. Most core baking is done at night. During the day, two of the ovens are used for baking cores set in racks.

About 20 coremakers are employed in this department. The core-room is equipped for both floor and bench work and is equipped with four coreblowers.

All the bench coremakers and the coreblowers are located along a conveyor belt which transports finished cores to a point close to the core ovens, where they are removed by one man, sometimes sprayed, then placed in racks.

Large cores are handled by an overhead crane. Core sand is transported to the coreroom in metal boxes from a muller located close by. Small batches are made in a portable muller.

Because of yard restrictions, the company has originated an unusual and economical cupola charging system. Drop-bottom charging buckets for coke and metal charges are loaded, weighed and numbered as instructed and are conveyed by lift truck to an outside overhanging platform at cupola charging floor level. Charging buckets are weighed by an indicator scale on the truck.

The same man who makes up and conveys charges to the overhanging platform charges the cupola, using another truck on the charging floor. The drop-bottom charging buckets are tripped by overhanging projections on each side of the cupola.

## Norton Co. Holds Open House To Mark Opening of New Plant

To mark the formal opening of its new plant in Santa Clara, Calif., Norton Co., Worcester, Mass., will hold an open house on May 7-9. Manufacturing facilities and the office will be opened for visits by employees and their families, representatives of newspapers and technical publications, contractors, local business and community leaders and West Coast distributors.

The plant is located at 2555 Lafayette St., Santa Clara. It was purchased by Norton Co. in 1954, and conversion for grinding wheel manufacture was started last year. The first wheel was produced in December. The facility is said to be the first on the West Coast to produce a complete line of grinding wheels, including the diamond type.

Norton has purchased an additional 7½ acres of land, including a warehouse-type building, to the east of and abutting its present property, bringing the total to 15½ acres. It will be used for future expansion of the Santa Clara plant.


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**to meet specific temperature and pouring conditions**

***UNUSUALLY HIGH T/C FACTOR***

**gives cores high strength and easy collapsibility**

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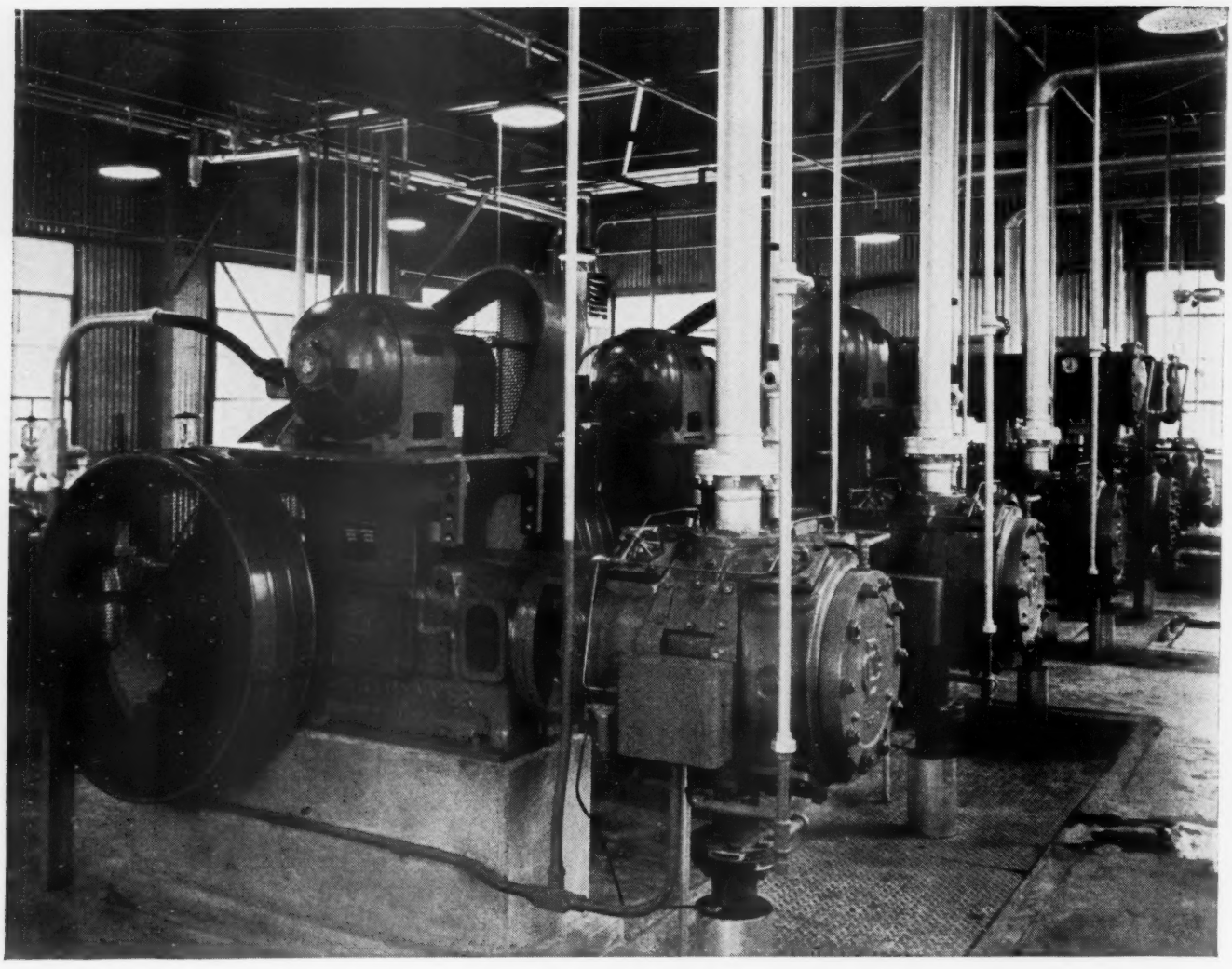

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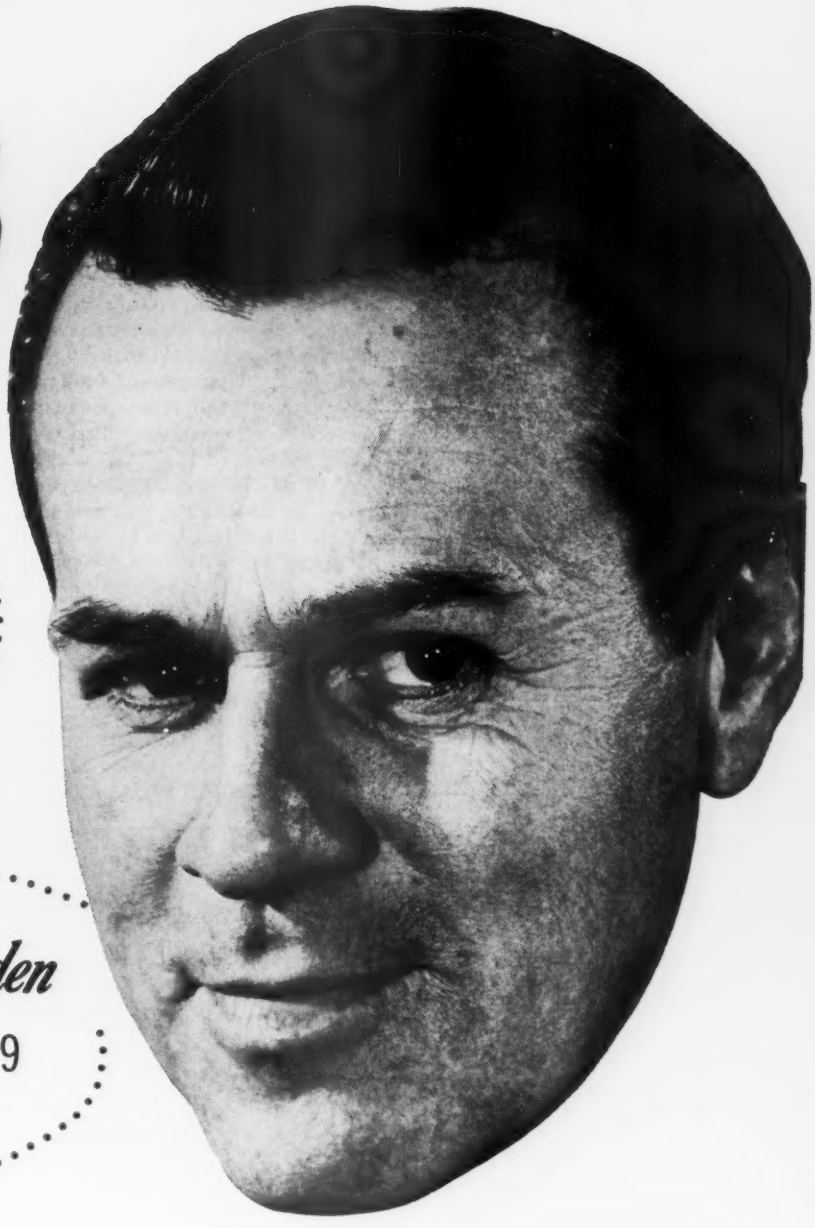

"we see *Borden* for the best foundry resins!"

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Drop in and visit us when you're at the convention. If you're an old friend, we'll enjoy seeing you again. And if we don't know you, let's get acquainted! Maybe we can help you with *your* foundry resin problem.

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At *any* time (convention or not) we'll be happy to have a technical representative call on you to discuss any problems that can be overcome with a Borden resin. Contact The Borden Company, Chemical Division, Dept. F-56, 350 Madison Ave., New York 17, N. Y.

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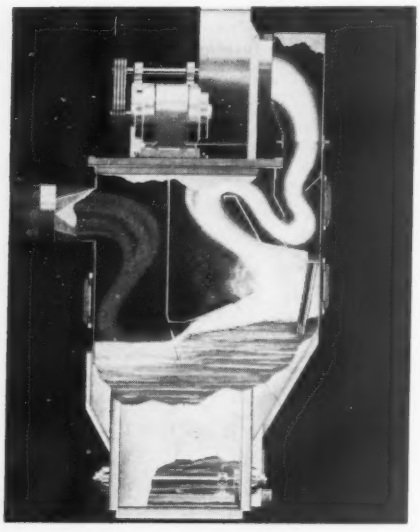
UREA AND PHENOLIC CORE BINDERS . . . SHELL MOLD RESINS . . . CORE SPRAY . . . CORE PASTE . . . PARTING AGENTS

# New Equipment and Supplies



## Wet Dust Collector★

**transfers dust by movement of air without mechanical means**

Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Wet dust collector achieves atomizing of water and mixing with the air stream to permit dust transfer by the movement of air without mechanical means. As dust-laden air enters the inlet chamber, heavier particles sink to the bottom. High-velocity air passes through venturi tubes, drawing water with it and breaking it into minute particles. Particles mix thoroughly with the remaining dust in the air. Air, water and sludge mixture impinges at high velocity on special surfaces in the discharge chamber. Sludge settles to tank bottom. Washed air flows through an eliminator section for removal of droplets, and clean air is discharged.

For More Details Circle No. 501—Page 347

## Cutting-Gouging Tool

**gets power from versatile, specially designed machine**

Hobart Bros. Co., Troy, O.—Machine is designed as a power source for the carbon arc-compressed air method of cutting and gouging all kinds of metals. Unit is rated 1000 amps on 85 per cent duty cycle or 900 amps on 100 per cent duty cycle at 36 to 54 v. Machine is designed for use on electric power supply of 2- or 3-phase, 60-cycle, 220/440 v (dual) or 550 v (single). It can also be supplied for operation on 50 cycles or 25 cycles, as well as direct current supply of 115, 230, 440 or 550 v.

For More Details Circle No. 502—Page 347

## Electric Furnaces★

**contain refinements that give better overall performance**

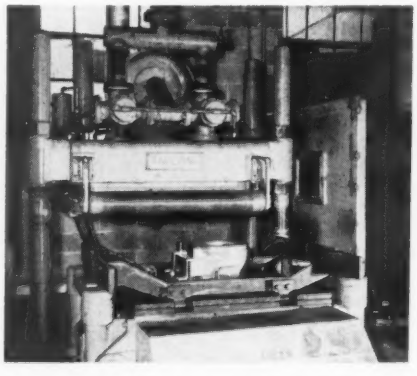
Lectromelt Furnace Corp., Division of McGraw Electric Co., P.O. Box 1257, Pittsburgh 30, Pa.—Electric furnaces in complete range of sizes from 25 lb to 200 ton capacity are being constructed with higher electrode speeds, improved four-point suspension of the roof, power-operated electrode holders and increased holding capacity. Working scale models of an 11-ft-diam, 12-ton-capacity unit and a 22-ft-diam furnace will highlight these features at the AFS show.

For More Details Circle No. 503—Page 347

## Diaphragm Machine★

**handles single flasks from 12 x 18 to 48 x 60 in.**

Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 North Wacker Dr., Chicago



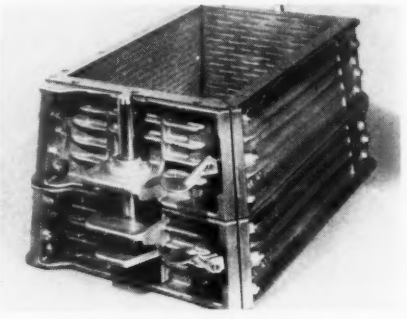
6, Ill.—Diaphragm molding machine is said to make high-pressure molding and precision green sand molding available to every foundry. All variations of jolting, peening, ramming, tucking and butting are claimed to be eliminated. Mold hardness is said to be uniform and consistent. Squeeze pressures are two to ten times greater than those usually used in molding practice. Noise is minimized. Present range of machines includes provisions for converting equipment to duplex molding.

For More Details Circle No. 504—Page 347

## Mechanical Corner Flasks★

**of aluminum or magnesium have straight-line locking devices**

Newaygo Engineering Co., Newaygo, Mich.—Mechanical corner flasks are offered in cast aluminum or magnesium, with cast aluminum or iron jackets available to fit all flask sizes. Corner locking handle works directly in a straight line. Handles can be placed in any one of four positions. Flask opens, closes and locks



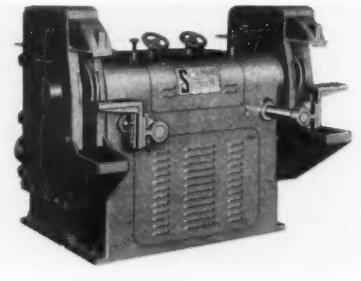
with straight-line action of bolts to eliminate binding. Corner pin guides and springs are sealed against sand. Draw pins are hard chrome plated, centerless ground and polished for true diameter. Sides are flat so flask can be set on edge without tipping. Available sizes are 4 to 7 in. deep x 12 to 30 in. wide x 12 to 30 in. long, in increments of 1 in. Upsets available in 1 x 2 in. depths and 4 and 5 degree tapers.

For More Details Circle No. 505—Page 347

## Snagging Grinders★

**feature independently operating wheels at each end**

Standard Electrical Tool Co., 2507 River Rd., Cincinnati 4, O.—Twin-motor, double-end grinder is a two-in-one machine as each wheel is independent and operates at its own correct, efficient speed, irrespective of wheel diameter. One wheel may be



stationary while the other operates. Three sizes are available: Two 7½-hp or two 10-hp motors for 24-in.-diam wheels and two 10-hp motors for 30-in.-diam wheels. Grinders feature structural plate steel wheel guards. Safety interlock is positive in maintaining exactly 9000 sfpm throughout wheel life. Speed change is made while grinder is running by

## ON DISPLAY AT ATLANTIC CITY

**Starred ★ items described on these pages represent new or improved products which manufacturers will display at the American Foundrymen's Society exhibit at Atlantic City, May 3-9. A complete list of exhibitors and their booth numbers starts on page 170 of this issue.**

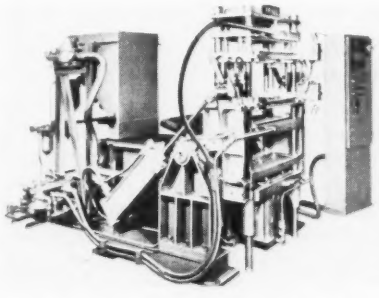
partial turn of a hand wheel. Single wheel grinder can be supplied with 5 or 7½-hp motors for use with 20-in. wheels or 7½, 10, 15, 20, 25, 30, 40 or 50-hp motors for use with 24 or 30-in. wheels.

For More Details Circle No. 506—Page 347

### Shell Machine★

**for cores and molds operates at 50 to 90 cycles per hour**

Sutter Products Co., 2005 Westwood Ave., Dearborn, Mich.—Automatic machine blows cores, both solid and hollow, as well as shell molds at 50 to 90 cycles per hour. Coating and curing times are adjustable, and pattern temperatures are con-



trolled thermostatically. Coreboxes and molds are split type, independently gas heated. Unit requires 6 ft 9 in. x 6 ft 10 in. space, including control panel. Maximum box size is 10 x 14 x 24 in. Maximum draw is 5 in. Maximum core or mold weight is 16 lb. Larger model, with 10 x 20 x 38 in. corebox, can be supplied.

For More Details Circle No. 507—Page 347

### Core Shooters★

**operate on same principle as conventional coreblowers**

Carver Foundry Products, 1056 Hershey Ave., Muscatine, Iowa—German core shooting machine introduces air at high pressure into a sand container and forces sand through the shooting aperture into the corebox. Air acts like a ram on the sand in the container. Shooting operation lasts only a fraction of a second and only a small amount of air penetrates the sand and must be released together with the air present in the corebox cavity. It is claimed that with this technique, wooden coreboxes can be used as successfully as metal boxes. Pressures used are about 85 psi. Satisfactory cores may be made at pressures ranging from 70 to 100 psi, depending upon size and shape. Four sizes of machines are available.

For More Details Circle No. 508—Page 347

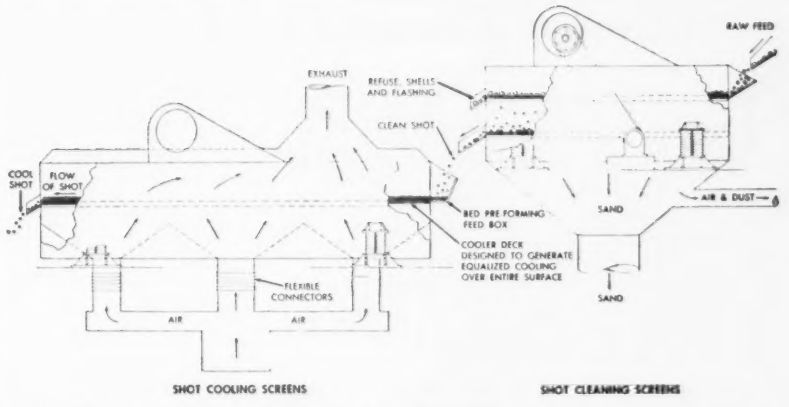
### Magnetic Inspection★

**offers foundries time and money-saving possibilities**

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.—Operator and inspector time can be saved, product improved and production costs reportedly reduced through in-

stallation and use of magnetic inspection and stress analysis methods. Newly developed portable equipment when used for inspection, sample checking and salvage operations will provide substantial savings, according to the manufacturer. Automatic inspection techniques impress upon design engineers the need for better designs that are easier and

### System Cools and Separates Backing Shot★




VIBRATING SCREENS have been successfully incorporated into a system for cooling and separation of shot used as backing material in shell molding operations. Shot is separated from castings and cleaned to remove sand and flashing. Material is separated by a double-deck vibrating shot screen, the top deck being a scalping deck for flashing and the large pieces of the shell. Smaller pieces pass through the scalping deck and are pulverized while the shot is passing over the lower deck. Use of air for cleaning shot on the lower deck provides some initial cooling also.

Clean shot is put over single deck vibrating shot cooling units. Number of units required depends on the temperature of the shot and tons per hour to be handled. When passing large volumes of room-temperature air through a controlled depth of bed material, an efficient heat exchange is effected, according to the manufacturer. No water is used in the system although it is possible to incorporate water to speed up cooling when handling shot of extreme temperatures.

The system uses conventional horizontal vibrating screens and is designed and engineered by Hewitt-Robins Inc., Stamford, Conn., to meet the exacting requirements of various operations.

For More Details Circle No. 585—Page 347

cheaper to cast and lend themselves readily to mechanized production operations.

For More Details Circle No. 509—Page 347

## Tower and Core Ovens★

**incorporate new and improved design and operating features**

Foundry Equipment Co., 1821 Columbus Rd., Cleveland 13, O.—Dielectric core ovens of the type shown here can bake 120 lb and heavier cores in an 11-minute cycle. Oven is one of the largest in present use

in the foundry industry. New design and operation features are being incorporated into company's tower ovens to show substantial savings in space, construction and operation. A new heat distribution principle is a result of engineering studies, and the new ovens reportedly will accomplish faster baking with less fuel due to increased efficiency in the entire cycle.

For More Details Circle No. 510—Page 347

## Core Blowplate★

**ideal for jobbing production can be changed very quickly**

Dodge Steel Co., 6501 Tacony St., Philadelphia 35, Pa.—Blowplate unit consists of three plates with blowholes through each plate. Upper plate is fastened to coreblower magazine. Lower plates are bolted together, forming a single unit, with blowtubes acting as spacers. Lower of these two plates contains vents. A gasket, which permits sand to go through selected blowtubes, is inserted between upper and lower blowplates. Latter is raised locking gasket in position. Plates can be changed in about 15 seconds. No rods are required in most cores. Wood as well as metal coreboxes can be blown. No vents are required in the boxes.

For More Details Circle No. 511—Page 347

## Phenolic Resin★

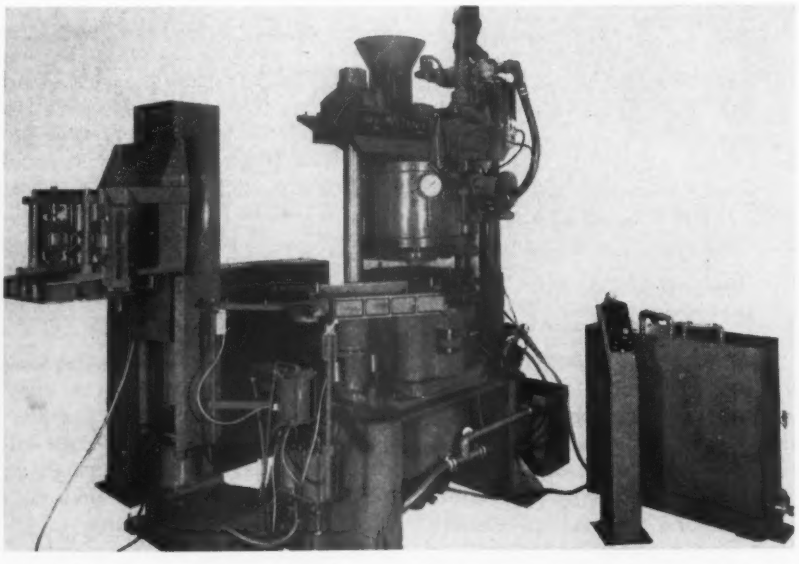
**for use with cold coated sand which can be dumped or blown**

Hooker Electrochemical Co., Durez Plastics Division, North Tonawanda, N. Y.—Improved resin for coating sand is used with company's cold coated process to produce sand for either dumping or blowing shell cores

and molds. With the cold-coated process there is no dust, segregation is eliminated, mold or core structure is said to be uniform and minimum lubrication is required, it is claimed. Mulling time is reported to be reduced and no caking or packing is encountered normally. Fast curing properties shorten the over-all cycle.

For More Details Circle No. 512—Page 347

## Unit Produces Completed Mold in 18 Seconds★



AUTOMATIC stack mold blower and squeeze machine is equipped with a three-station turntable and automatic stacking unit. It is capable of producing completed mold sections on a 17 or 18-second cycle. Empty flasks are placed on the turntable and finished molds are automatically removed and stacked while a third flask is being blown and squeezed. Machine will handle flasks up to 6 x 18 x 18 in. with a 5 in. pattern draw. Machine can be equipped with automatic handling of flasks in and out of turntable for automatic closing of molds, and controls can be provided for an automatic, repetitive mold blowing cycle. Equipment is manufactured by the San-Blo Division, Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.

For More Details Circle No. 586—Page 347

## Refractories★

**of several kinds are designed to meet varying requirements**

Mexico Refractories Co., Mexico, Mo.—Castable refractory in the 3000° F class has low shrinkage and resistance to spalling characteristics, is placed by trowelling, pouring, gunning or extruding and is recommended for applications where reducing atmospheres, carbon deposition, irregular temperatures or abrasion are present. Standard 9 in. series of shapes, cupola blocks and tapout blocks made by dry press method are recommended for use below the metal line in cupolas as well as in ladles, runners, carriers and spouts. Hydraulic-setting ramming refractory is designed for lining aluminum melting furnace floors and side walls below the metal line.

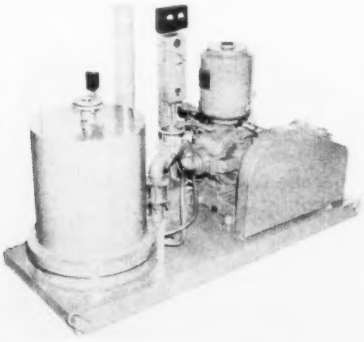
For More Details Circle No. 513—Page 347

## Vacuum Degassing Unit★

**has chamber to accommodate up to 1000 lb of molten metal**

Centrifugal Casting Machine Co., P.O. Box 947, Tulsa 1, Okla.—Vacuum degassing chamber can accommodate up to 1000 lb of molten metal in ladles or crucibles at pressures below 200 microns. Actual minimum pressure obtainable depends upon the metal being processed. Time required for degassing varies from 5 to 10 minutes. Depending upon the type of

metal being degassed, the entire cycle from time molten metal in a crucible is placed in the chamber to the time that the chamber is



opened and the crucible lifted out ready for pouring takes from 6 to 15 minutes.

For More Details Circle No. 514—Page 347

## $CO_2$ Core Binder

**is tailor-made to meet specific operating requirements**

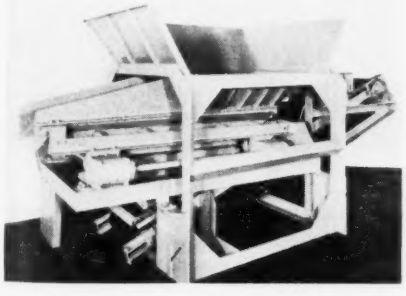
Prenco Products Inc., 507 East 10 Mile Rd., Hazel Park, Mich.—Tailor-made silicate-base type core binder is offered in special formulations to meet specific temperature and pouring conditions. Binder is prepared to meet requirements of metal being cast, pouring temperatures, casting size and size and shape of core. Typical cores made with the binder are said to have a high ratio of tensile strength to collapsibility time.

For More Details Circle No. 515—Page 347

## Scrap Control★

**system removes castings and cleans sand in one operation**

Royer Foundry & Machine Co., 158 Pringle St., Kingston, Pa.—Scrap control unit supplies mechanized casting removal and sand cleaning



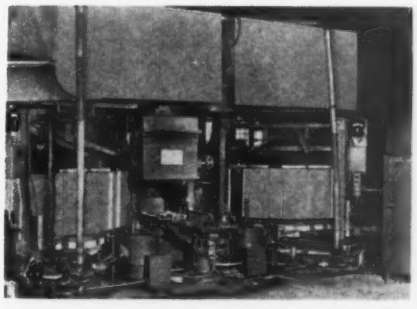
in one operation. Sand and castings from molding floor are deposited into the hopper on the unit. Walking-beam action of the shakeout breaks up the sand and conveys the castings and large scrap to a sorting table or conveyor. Magnetically cleaned sand is discharged at the opposite end to the muller skip hoist conveyor belt to a sand system or into a separator or blender for complete conditioning. Entire unit is above floor level. Unit can handle up to 60 tons of clean sand per hour and is adaptable to mechanized operation.

For More Details Circle No. 516—Page 347

## Shell Mold Machine★

**uses vertical drop of the mix to the heated pattern plate**

Shell Process Inc., McKinstry Ave., Chicopee, Mass.—Twin shell molding machine has a hydraulically actuated investment chamber rollover and pattern rotation that allows one operator to produce shell molds and cement them together from two different patterns continuously. Machine features vertical drop of the sand-resin mix onto the surface of the heated pattern plate. Thin shells are pushed off the patterns without breakage by a large-diameter, long-stroke ejection cylinder.

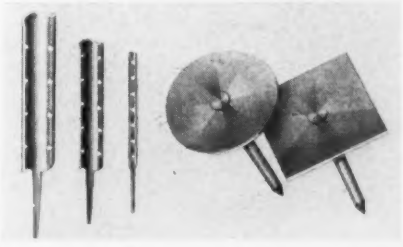


For More Details Circle No. 517—Page 347

## Chills and Nails★

**have been redesigned to give better operating performance**

Fanner Mfg. Co., Brookside Park, Cleveland 9, O.—Scab nail is said to cover four times the area of conventional large head foundry nails. They are supplied in 1 in. round or square head in sizes from $\frac{7}{8}$ to $2\frac{1}{2}$ in. long. S-shaped chills can be supplied in $\frac{3}{8}$, $\frac{3}{4}$ and $1\frac{1}{4}$-in. widths and in lengths from $\frac{1}{2}$ to 4 in. Chills are claimed to provide increased chilling surface and their design and holes permit more through-flow of metal and better fusion. They are made in three gages and finished in copper, tin or aluminum coating.



For More Details Circle No. 518—Page 347

## Cupola Dust Collector★

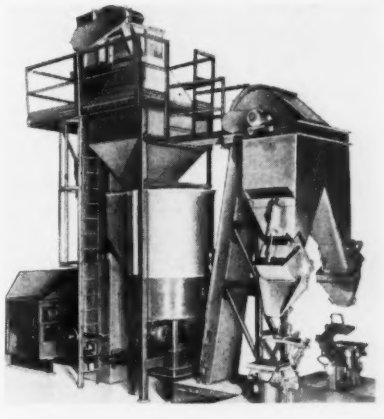
**contains multiple cells to meet various collection requirements**

American Air Filter Co., Louisville 8, Ky.—Cupola dust collector is a multiple tube dry centrifugal type of design that permits the exhaust of large gas volumes containing abrasive dusts even in high concentra-

## Prepared Sand Is Fed to Overhead Hopper★

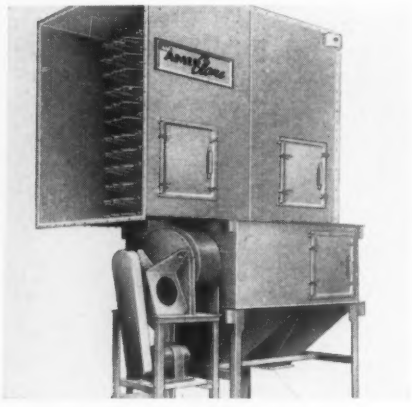
SAND PREPARING, elevating, aerating and storage unit is designed to provide overhead sand for up to four molding stations and can be used with any of the company's mullers. Integrated unit is comprised of a combination elevator - aerator which receives the discharge from the muller for delivery to an attached molder's hopper. The elevator reportedly can elevate and aerate the entire batch from any company muller in 30 seconds.

Unit can be supplied to fit specific foundry requirements as to capacity, layout, position and number of molder's hoppers. The elevator mechanism can be supplied separately. Other features and advantages claimed are free-flowing, lump-free sand delivered from an overhead supply to make the molder's work easier, one operator can supply sand for up to four molders, and floor area for sand preparation and molding is centralized. The equipment is manufactured by National Engineering Co., 646 Machinery Hall Bldg., Chicago 6, Ill.



For More Details Circle No. 587—Page 347

tions. A single cast iron tube is 4 in. in diameter and has an approach velocity of 1000 fpm with a cleaning capacity of 330 cfm. Multiple combinations of cells are used to meet the exhaust volume required. Unit at nor-



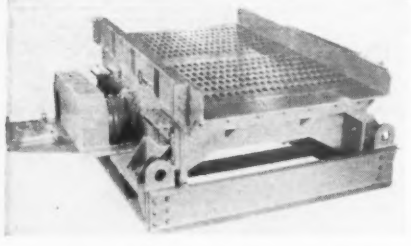
mal rating has a pressure drop of 4½ in. at standard 70° F, 29.92 in. barometric pressure air. Standard construction is good up to 750° F and special materials can be provided for higher temperatures.

For More Details Circle No. 519—Page 347

## Shakeout★

**has an all-cast ductile iron gyrating frame for long life**

Simplicity Engineering Co., Durand, Mich.—All-cast ductile iron gyrating shakeout frame measuring 4 x 6 ft reportedly is in operation handling high-temperature castings with no part of the unit operating at temperatures under 400° F. Advan-



tages are said to be ability to handle high temperatures, unusual sound-deadening quality which makes for quiet operation and ability to withstand punishment and wear.

For More Details Circle No. 520—Page 347

## Conveying System★

**can move any free-flowing material up to 10 ton per hr**

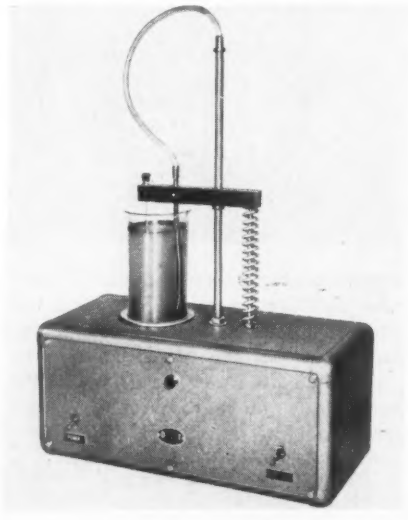
Spencer Turbine Co., Hartford 6, Conn.—Portable or stationary, motor or gasoline-driven pneumatic conveying systems can be used on dry and free flowing materials up to 10 tons per hour. System consists of a vacuum producer, separators and vacuum lines. System is entirely closed, helping to minimize dust problems. Separator helps remove pieces of slag or foreign material from sand prior to reuse. Sand can be conveyed vertically where necessary to conserve space in the plant.

For More Details Circle No. 521—Page 347

## Clay Determination★

**instrument helps speed AFS clay determination test**

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.—Precision testing device is designed to speed removal of clay particles as part of the AFS clay determination test. Machine is fully automatic, incorporating two solenoid valves for filling and siphoning, an electronic control device to govern height of water in the container and a relay sequence circuit to control timing and



initiate the individual operations. Maker claims excellent agitation takes place each time the wash jar is refilled.

For More Details Circle No. 522—Page 347

## Electric Drills

**are light weight but built for heavy-duty service**

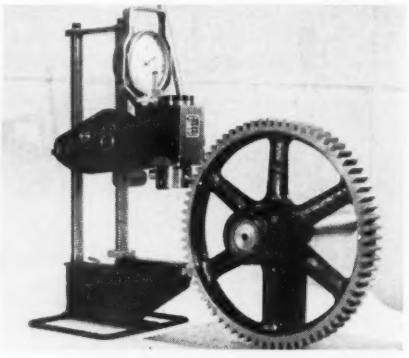
Bevoco Supply Co., 5419 West Schubert Ave., Chicago 39, Ill.—Single-phase, ac motor on lightweight, heavy-duty electric drill is gear reduced to give a speed of 450 rpm under full load and has an output of 160 w. Drill has a trigger grip and grease cup for lubrication. Half-inch size weighs 7½ lb.

For More Details Circle No. 523—Page 347

## Portable Hardness Tester★

**is for testing large gears with readings on the pitch line**

King Tester Corp., 440-44 North 13th St., Philadelphia 23, Pa.—Portable brinell hardness tester incorporates features found in company's regular testers but is used to make tests on large gears and provide accurate readings on the pitch line. Accessories are available to increase versatility of the standard portable



tester. One adapter will reverse the direction of the applied load and give readings inside pipes, tubes and other hard-to-get-at spots. A test head for offset and deep testing also is available.

For More Details Circle No. 524—Page 347

## Bench Coreblower★

**is entirely automatic and is actuated by pushbuttons**

Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Bench coreblower is entirely automatic in operation and is actuated by pushbutton control. Clamping, blowing and unclamping are automatically sequenced to assure error-free operation. Two models are available with capacities of 4½ lb per blowing cycle. Each has a removable table

clamp which permits handling of vertically-split coreboxes. Either vertically-split, horizontally-split or open-face coreboxes can be handled.

For More Details Circle No. 525—Page 347

## Air Weight Controller★

**is one aid for stabilizing foundry operating conditions**

Foxboro Co., Foxboro, Mass.—Extensive instrumentation available includes an air weight controller to aid

# HELPFUL
# Foundry Literature

**CIRCLE NUMBERS on card for literature you want.**

**FOUNDRY**

## INFORMATION SERVICE

Handy Reader Service cards bring you more information on products or services described or advertised in this issue.

### 601. Core Oils

E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.—Data sheets describe company core oils Nos. 331, 392, 397 and 398. Physical properties are given and each oil is evaluated on the following characteristics: Baking speed, resistance to overbaking, effectiveness in sands, green sand properties, compatibility with other core mix ingredients, resistance of baked cores to moisture pick-up and gas content of baked cores.

### 602. Grinding

Norton Co., Worcester 6, Mass.—Vol. 45, No. 12 of "Grits and Grinds" provides information on grinding wheel developments, a barrel finishing abrasive and abrasive belts.

### 603. Metallurgical Research

Battelle Memorial Institute, 505 King Ave., Columbus 1, O.—Folder contains illustrative and descriptive information on institute's basic, theoretical, developmental, engineering and pilot plant studies in all branches of metallurgy.

### 604. Sandblast Machines

Leiman Bros. Inc., 102 Christie St., Newark 5, N. J.—Sandblast machines for cleaning, deburring and surface preparation are illustrated and described in bulletin 1256. Included are standard cabinet type, automatic type with rotating basket inside, bench type cabinet model for laboratory or small shop and a large cabinet type with portable blast nozzle for large pieces.

### 605. Hot Blast Heater

Whiting Corp., 157th and Lathrop Ave., Harvey, Ill.—Over-all operating efficiencies in excess of 70 per cent with a hot blast heater adaptable to any foundry are covered in bulletin FY-174. Installation reportedly is simple and consists of bolting the heater to the foundation, connecting fuel lines, electrical wires and exhaust stacks.

### 606. Die Casting

DCMT Sales Corp., 80 Shore Rd., Port Washington, N. Y.—Booklet explains specialized techniques used in small parts, high-speed die casting production. Detailed information is offered on the die casting process, with additional information on equipment, installation, service and maintenance requirements.

### 607. Moisture Determination

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.—Bulletin SL-1 illustrates and describes every item needed for accurately analyzing the amount of moisture in any solid, granular, liquid or semiliquid material.

### 608. Wire Rope Assemblies

American Chain & Cable Co., Wire & Rope Division, 929 Connecticut Ave., Bridgeport 2, Conn.—Bulletin TL 500 contains data on construction features, applications, breaking strengths and other general informa-



## ADVERTISED PRODUCTS and SERVICES

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## May 1956

**Note—Where more than one advertisement appears on a page, the following code is used: R (right); L (left); T (top); B (bottom); 1-2-3-4 (in order from top to bottom); IFC (inside front cover); IBC (inside back cover); OBC (outside back cover).**

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| 13 | 49 | 92-93 | 216 | 256L | 292 | 325 | 365R | 397T | 409L1 |
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| 29 | 72-73 | 187 | 236R | 272-3 | 310L | 341 | 380R | 405T | 439 |
| 30-31 | 74 | 189 | 237L | 274 | 310R | 352-3 | 381 | 405L | 440 |
| 32 | 75 | 191 | 237R | 275 | 311 | 354T | 382 | 405R | IBC |
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## EQUIPMENT and SUPPLIES—HELPFUL LITERATURE

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tion on fittings and wire rope assemblies. Among the fittings illustrated are yokes, sleeves, standard buttons, round eyes, straight hole eyes, hooks, balls, aircraft terminals and straps.

### 609. Resin Coated Sands

Hooker Electrochemical Co., Durez Plastics Division, North Tonawanda, N. Y.—Booklet, "Guide to Resin Coated Sands," is available as a companion source of information to the company's "Guide to Shell Molding." The resin-coated sand booklet is a complete text on coating procedures.

### 610. Air Conditioning

Larco Inc., Route 20 East, Painesville, O.—Bulletin 561 points out the values of air conditioning crane cabs, pulpits and heat relief rooms and illustrates and describes air conditioning units and their advantages.

### 611. Air Tube Systems

Lamson Corp., Syracuse 1, N. Y.—Catalog, "Airtube On Target," describes a series of pneumatic tube systems designed to meet a variety of industrial and commercial communication and delivery requirements.

### 612. Mechanical Lift

Skarnes Engineering & Supply Inc., 2907 East Franklin Ave., Minneapolis 6, Minn.—In-use photos, specifications and general data on five models of a mechanical lift with capacities up to 10,000 lb are contained in folder.

### 613. Die Casting Machine

Cleveland Automatic Machine Co., Cincinnati 12, O.—Bulletin illustrates, describes and details the engineering features of a 400-ton locking pressure die casting machine available in either hot or cold chamber styles.

### 614. Rollover Machines

Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Folder contains specifications and in-use photographs of line of automatic jolt, rollover, pattern draw molding machines from 600 to 10,000 lb capacities with pattern draws from 10 to 30 in. and maximum daylight to 76 in.

### 615. Wire Straighteners

San-Blo Division, Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.—Catalog CW-10 covers construction details and operational features of several wire straightening machines. Numbered parts list is keyed to schematic diagrams to facilitate ordering.

### 616. Ovens

Despatch Oven Co., 819 Eighth St. S.E., Minneapolis 14, Minn.—Bulletin 100 describes four models of laboratory ovens and four models of production ovens with emphasis on types, applications, capacities, controls and specifications.

### 617. Rotary Air Pumps

Leiman Bros., 102 Christie St., Newark 5, N. J.—Construction details, dimensions, capacities and performance curves on rotary air and vacuum pumps and accessories are found in catalog 755.

### 618. Electric Fork Trucks

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, O.—Bulletin 1328-A pictures electric fork trucks with 7000, 8000 and 10,000-lb capacities. Full description of each truck and its components, with dimensions, specifications and available attachments, is included.

### 619. Spectrographic Supplies

Jarrell-Ash Co., 26 Farwell St., Newtonville, Mass.—Spectrographic suppies catalog contains listings of special pure materials and alloy standards, carbon and graphite rods and powders, preformed electrodes, photographic plates, film and processing chemicals and a list of text and reference books.

### 620. Silicone Products

Dow Corning Corp., Midland, Mich.—Reference guides to company's silicone products cover 150 of the most used silicones, 18 of which were introduced last year. Products are indexed and grouped by physical form and cross indexed according to application.

### 621. Fluid Power

Rivett Lathe & Grinder Inc., Brighton 35, Boston, Mass.—Line of valves, cylinders and power units, both air and hydraulic models, are featured in bulletin.

### 622. Heat Treating

Metal Treating Institute, 271 North Ave., New Rochelle, N. Y.—Reference sheet is designed to aid purchasers of heat treating services with proper ordering and specifications.

### 623. Grinding Wheels

Bay State Abrasive Products Co., Westboro, Mass. — Booklet details company's use of electronic computers to the calculation of manufac-



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turing formulas for grinding wheels to provide more accurate engineering, manufacturing and duplication of orders.

### 624. Group Wash Fountains

Bradley Washfountain Co., North 22nd & West Michigan Sts., Milwaukee 1, Wis.—Catalog 5601 presents line of group wash fountains, showers and drinking fountains. Catalog contains information on foot-control mechanisms and data on comparative costs and advantages of group washing versus ordinary wash fixtures.

### 625. Electric Buckets

Erie Strayer Co., 1851 Geist Rd., Erie, Pa.—Book, "More Work Faster with Strayer Electric Hook-on Buckets," is filled with data, specifications, tabulations and field applications of alternating current and direct current operated electric buckets in capacities up to 4 cu yd.

### 626. Air Cylinders

Petch Mfg. Co., 463 York, Detroit 2, Mich.—Engineering drawings and specifications of heavy-duty air cylinders with interchangeable mountings designed to JIC standards are contained in catalog.

### 627. Locking Sling

Caldwell Co., 3411 Auburn St., Rockford, Ill.—Operating principles and engineering features of equalizing and locking slings are illustrated and described in form 354.

### 628. Alloy Price List

Electro Metallurgical Co., Division of Union Carbide & Carbon Co., 30 East 42nd St., New York 17, N. Y.—Price list contains analyses, available sizes and prices for over 50 different ferroalloys and metals used in the production of steel and iron.

### 629. Industrial Lighting

Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.—Booklet on "Better Industrial Lighting with Mercury Vapor" contains photographs showing typical applications of mercury vapor lamps, a section of engineering hints for effective installations and information on how to combine mercury lamps with fluorescent or incandescent lighting.

### 630. Dust Collectors

Torit Mfg. Co., 287 Walnut St., St. Paul 2, Minn.—Line of cabinet cloth filter and cyclone separator dust collectors is pictured and described in catalog. Line drawings illustrate specifications, and cutaway drawings show operational procedures.

### 631. Direct-Fired Heaters

National Heater Co., 2140 Kasota, St. Paul, Minn.—Brochure describes line of direct-fired heaters ranging from 200,000 to 2,000,000 Btu. Heaters use light or heavy oils, gas or combination fuels and are self-contained units wired and flame tested before shipment.

### 632. Helical Gear Drives

Link-Belt Co., 307 North Michigan Ave., Chicago 1, Ill.—Helical gear drives are described in book 2651. Load classes for over 250 applications, overhung load ratings and dimension tables, instructions on selection and cutaway views of both double and triple reduction drives are given.

**FOUNDRY**

## INFORMATION SERVICE

**Handy Reader Service cards bring you more information on products or services described or advertised in this issue.**

### 633. Ultrasonic Systems

Acoustica Associates Inc., Glenwood Landing, Long Island, N. Y.—Bulletin MW-103 describes ultrasonic power supplies, transducers and systems available for small and large-scale production requirements. Equipment has application in cleaning, degreasing, electroplating, drilling and grinding operations.

### 634. Zirconia

Zirconium Corp. of America, Solon, O.—Folder covers physical and chemical properties, characteristics and availability of zirconia products that reportedly have widespread use in refractory, abrasive, electrical, ceramic and catalytic applications.

### 635. Power Tools

Delta Power Tool Division, Rockwell Mfg. Co., 450 North Lexington Ave., Pittsburgh 8, Pa.—Booklet AD-980 lists ten reasons why the strategic use of power tools in a supple-




**ADVERTISED PRODUCTS and SERVICES** — **May 1956**

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**EQUIPMENT and SUPPLIES—HELPFUL LITERATURE**

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mentary capacity can increase production, improve product quality and reduce costs.

### 636. Insulations

Johns-Manville, 22 East 40th St., New York 16, N. Y.—Catalog IN-171A contains information on the composition, physical and thermal properties and sizes of thermal insulations and refractories for industrial applications in temperature ranges from 300° F below zero to 3000° F above zero.

### 637. Hardness Testers

Riehle Testing Machines, Division of American Machine & Metals Inc., East Moline, Ill.—Bulletin RH-12-54 covers two portable hardness testers using standard Rockwell indentors and loads on all scales. Scales available are A, B, C, D, F and G.

### 638. Sales Evaluation

Cappel, MacDonald & Co., Dayton 1, O.—Sales-management brochure, "Who's Selling Who," is intended to aid sales and management executives in evaluating and solving sales problems.

### 639. Power Sweepers

Wilshire Power Sweeper Co., 227 Dundee Ave., Elgin, Ill.—Bulletin contains general information on line of power sweepers and comparative costs between hand and power sweeping.

### 640. Cylinders

Tomkins-Johnson Co., Jackson, Mich. — Condensed reference form presents mounting dimensions and specifications on eight standard cylinders offered in 1 and 3-in. bores and seven styles in 4 to 8-in. bores. Cylinders are recommended for air to 200 psi and oil pressure to 750 psi.

### 641. Industrial Trucks

Automatic Transportation Co., Division of Yale & Towne Mfg. Co., 149 West 87th St., Chicago 20, Ill.—Line of electrically-driven industrial trucks that range from compact operator-led types to fork and ram trucks capable of lifting 100,000 lb are highlighted in catalog.

### 642. Convection Furnaces

Hevi Duty Electric Co., Milwaukee 1, Wis.—Application, construction and specification data on convection furnaces with temperature range to 1350° F are offered in bulletin 355. Nine standard size furnaces are available.

### 643. Crane Assemblies

Conco Engineering Works, Mendota, Ill.—Underhung single trolley push type, underhung hand geared and top running hand geared crane assemblies are detailed in bulletins 1400, 2200 and 2300 respectively.

### 644. Compressed Air

Van Products Co., 5738 Old Ridge Rd., Erie 7, Pa.—Booklet "Air, Water and Industry" describes the moisture problem in compressed air systems and tells how these problems can be overcome.

### 645. Steel Shelving

Frick-Gallagher Mfg. Co., 110 South Michigan Ave., Wellston, O.—Catalog 706 contains a discussion of the principles of a boltless steel shelving and emphasizes the ease and speed with which it can be erected. Various models of open, closed and ledge type shelving and parts and accessories are shown in detail.

### 646. Chemical Compounds

Swift Industrial Chemical Co., Canton, Conn.—Technical bulletins on heat treating, plating, finishing and allied compounds contain data sheets and information relating to heat treating salts, metal cleaning compounds, black oxide compounds, rust resisting oils and quenching oils.

### 647. Conveyor Systems

Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4, Mich.—Catalog 453 gives information and specifications on hand-pushed trolley conveyor systems, stub switches as well as necessary engineering data for installation and operation.

### 648. Flexible Hose

Flexaust Co., Division of Callahan Zinc-Lead Co., 100 Park Ave., New York 17, N. Y.—Bulletin 60 provides information and prices on company's flexible hoses and retractable exhaust ducts.

### 649. Electric Tools

Porter-Cable Machine Co., 33 Exchange St., Syracuse 8, N. Y.—Catalog 103 illustrates and describes a wide variety of electric tools for woodworking, grinding, cutting, trimming, drilling, polishing applications.

### 650. Air Devices

Lunkenheimer Co., Cincinnati 14, O.—Line of air devices designed to eliminate air leaks are described in circular 587. Dimensions, pressure requirements and descriptive information on each device are included.



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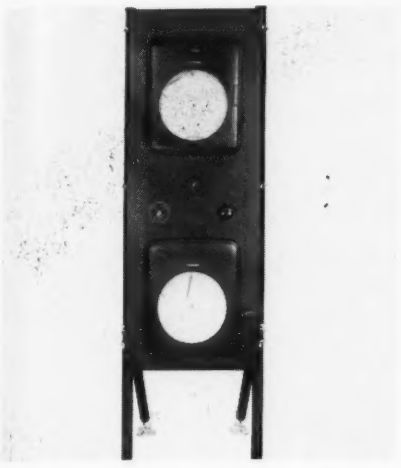
in stabilizing operating conditions by eliminating variations in blast air weight. Company will feature five types of instrumentation at their booth, including a blast moisture controller, instruments for controlling annealing furnace and core oven tem-



peratures, along with a pictorial outline of recommended instrumentation for cupola hot blast systems, ranging from inwall temperature recording to furnace reversal and hot blast temperature control.

For More Details Circle No. 526—Page 347

## Hand Lift Truck

**can move loads up to 3000 lb on small-diameter wheels**

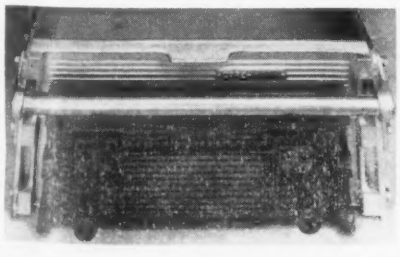
Market Forge Co., Everett, Mass. —Closed end hand lift truck can handle loads up to 3000 lb. Units feature handle lifting, ball bearing wheels and 4 in. lift. Trucks are supplied in 16, 18, 22, 24 and 27 in. widths. Platform lengths go up to 72 in. Front wheels are 8 in. in diam, load wheels 3¼ in.

For More Details Circle No. 527—Page 347

## Jackets★

**are designed for tight fit but permit free flow of gases**

Adams Co., P.O. Box 268, Dubuque, Iowa—Mold jackets are either cast iron or aluminum with all sections



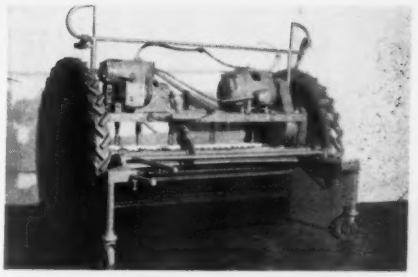
vertically grooved inside and horizontally grooved and ribbed outside. Inside corrugations are said to assure mold fit, to grip mold tightly while under pouring strain, permit free flow of gases from parting line, help keep jackets at a safe handling temperature and assist in removal from mold for shifting. Two types of lifting handles are incorporated into the end sections of all small sizes. Special handles are made for large sizes.

For More Details Circle No. 528—Page 347

## Sand Conditioner★

**has capacity for conditioning over 2 tons of sand per minute**

Moulders' Friend, Dallas City, Ill. —Compact, self-propelled sand conditioner has two travel and conditioning speeds in either forward or reverse. Special transmission permits any travel speed from 5 to 50 fpm. Rotary brush picks up small particles of used sand, the added bond and moisture and blends them. As sand is thrown to the rear, the



heap is aerated and fluffed. Machine has a capacity of 2 tons of conditioned sand per minute.

For More Details Circle No. 529—Page 347

## Freight Car Spotter★

**can develop a draw-bar pull of as much as 12,800 lb**

Whiting Corp., Harvey, Ill.— Heavy-duty tractor unit for hauling, switching and spotting railroad freight cars can develop a draw-bar

## Automatic Molding Machine Is Versatile★

TWO-STATION indexing jolt, squeeze, strip molding machine may be controlled automatically, semiautomatically or manually. Simultaneous operations are performed at each of the two stations. Two squeeze heads permit production of different patterns or cope and drag patterns. Proper jolt is insured by adjustable control valve and timing device. Squeeze pressures are adjustable to a maximum of 49,000 psi at 80 lb pressure. Maximum pattern draw is 18 in. Flasks that can be handled range from 20 to 30 in. wide to 24 to 36 in. long. Although not shown here an automatic flask charge and discharge mechanism is available.

Retractable squeeze head permits direct sand filling through variable sand hoppers mounted on squeeze head support. Squeeze piston is provided with a limit stop. Adequate registrations insure accurate location of flask at all positions. Jolting and squeezing operations are pneumatically controlled. Other operations are controlled by proven pneumatic-hydraulic application to insure fast, smooth, positive action. The Herman Pneumatic Machine Co., Pittsburgh 22, Pa., makes the unit.

For More Details Circle No. 508—Page 347

# DETROIT ROCKING ELECTRIC

ATTRITION MILLS AND GRINDING PLATES . . . BERYLLIUM COPPER MASTER ALLOYS . . . BRASS AND BRONZE PLUMBING GOODS . . . BRONZE BEARINGS AND BUSHINGS . . . BRONZE TEXTILE MACHINE PARTS . . . COAL STOKER PARTS . . . DIALS AND GAUGES . . . DIES . . . DUCTILE IRON PARTS FOR CEMENT MIXERS, LAWNMOWERS AND ORDNANCE MATERIAL . . . HIGH STRENGTH IRONS FOR AUTOMOTIVE PARTS . . . JET ENGINE PARTS . . . MALLEABLE IRON AGRICULTURAL IMPLEMENTS . . . MASTER ALLOYS AND INOCULANTS . . . NAVAL ORDNANCE BRONZES . . . NICKEL ANODES . . . OIL WELL PUMP LINERS . . . PARTS FOR ELECTRICAL PRECIPITATORS . . . RECOVERY PROCESSING OF METALLIC DROSSES . . . SPECIALTY STEELS . . . TOOL STEELS . . . TOOLS . . . WELDING ROD ALLOYS.

MEMBER FEMA

## DETROIT ELECTRIC FURNACE

**Kuhlman Electric Company**

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

# C FURNACES

## *melt metal for almost everything!*

The list on the opposite page testifies to the versatility of these great furnaces. Hundreds of high quality products, in bronze, brass, iron and ductile iron, are cast from the efficient flow of metal produced by Detroit furnaces.

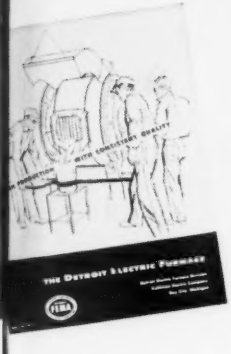
The indirect arc, free of the molten metal at all times, produces alloys of precise analysis in melt after melt. Rocking action results in maximum heat transfer, optimum utilization of power.

Detroit Rocking Electric Furnaces are capable of doing many jobs well. One furnace, equipped with extra shells, can melt a variety of metals and alloys. Interchange of shells is quick and easy, and the savings in installation work, transformers, wiring and floor space is large and important.

Capacities of Detroit Electric Furnaces range from 10 to 10,000 pounds.

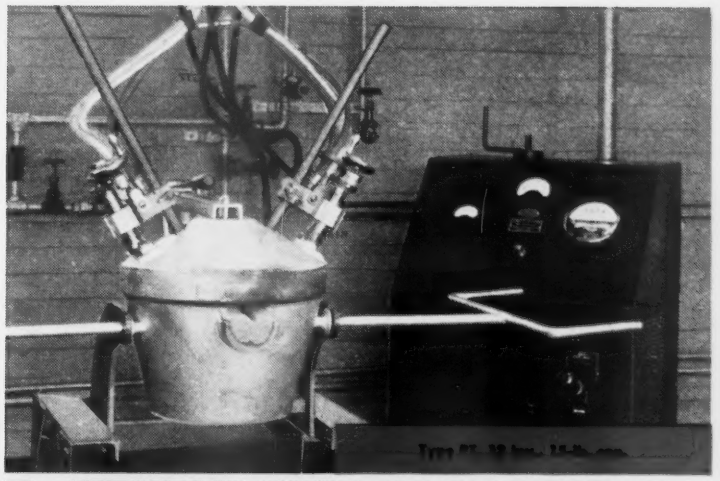
Send us your operating data. Let our engineers show you how a Detroit Electric Furnace will meet your needs.

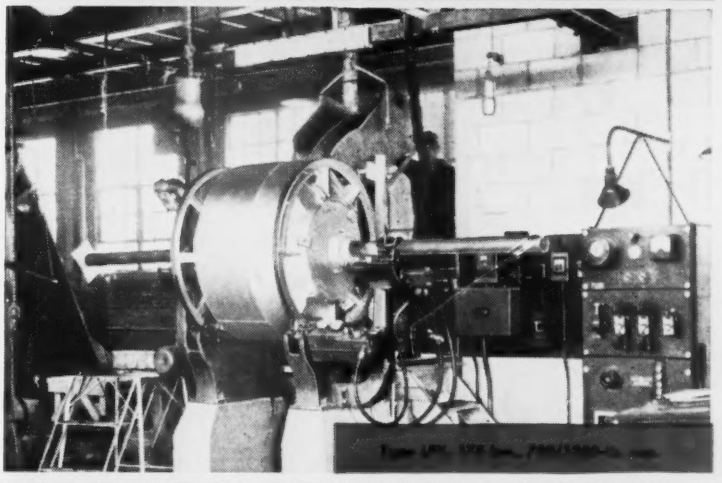
**See Us At The Show!**
**1956 Castings Congress and Exhibit**
**Atlantic City, May 3-9**
**Booth 1920**

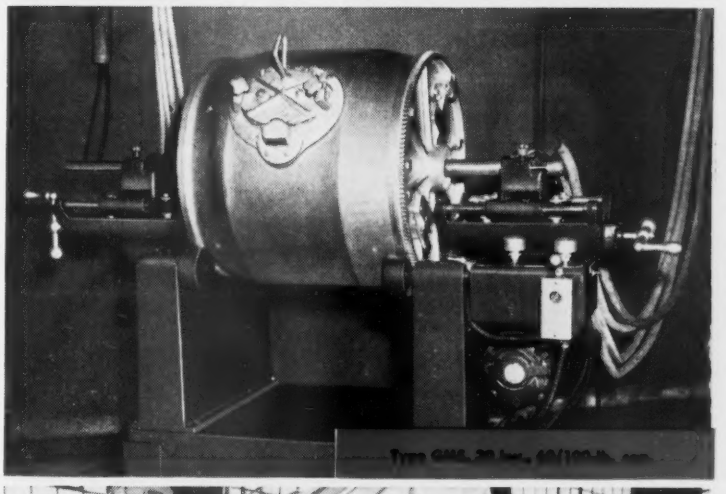


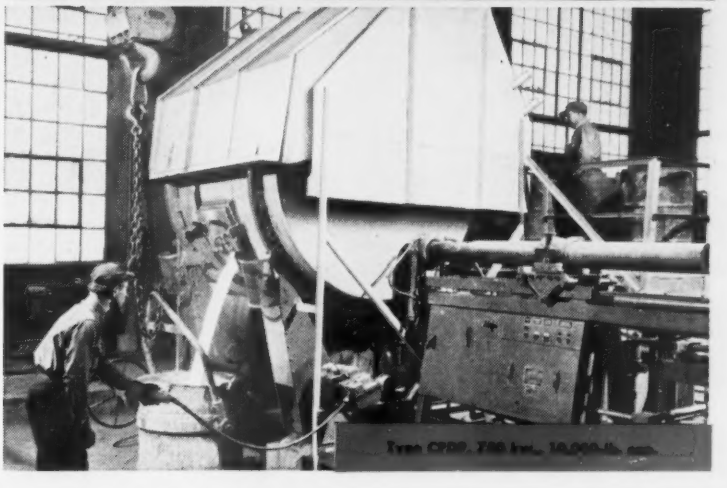

### WRITE FOR FREE BOOK

"High Production with Consistent Quality," shows and describes how you can get fast, modern, efficient melting. Includes ratings and operational data on all Detroit furnaces. Write today for Bulletin 559.

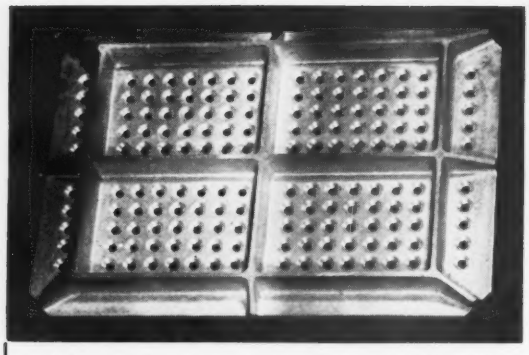








## C DIVISION
## any Bay City, Michigan



**CUSTOMCAST**
**Aluminum BOTTOM BOARDS**
. . .
**Standard or Special**

Reduce casting rejects and greatly curtail board losses with "CUSTOM-CAST", lightweight, rustproof, Aluminum bottom boards . . . at prices that will amaze you.

No charge for patterns on minimum orders of 50 or more custom boards.

Non-warping and non-burning, our boards assure uniform molds every time. Stacking problems eliminated. Boards not affected by weather.

Rib reinforced for strength and rigidity, with vent holes on face to permit gas escapement.

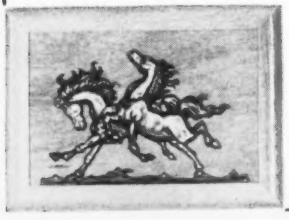
A raised sand strip around the outer edge peens each mold uniformly and eliminates sand slippage.

In event of accidental breakage or obsolescence, boards will be bought back by us at better than scrap prices.

Write for price list of standard sized boards which may meet your needs or send a sketch with dimensions on your custom board for our quotation and early delivery date.

Core Plates Available. Write for Details.

This letter opener is a typical example of a sculptured aluminum product, produced for Mr. "Cliff" Cornell; well known in the foundry trade.



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9617 CLINTON ROAD • CLEVELAND 9, OHIO

Manufacturers of the Famous Contemporary Metalcraft Sculptured Aluminum Plaques for Home & Industrial Gift Giving—Special Plaques are our Specialty. Inquire.



**USING TOO MUCH COKE?**

Why not talk this over with one of our metallurgists with a view to taking advantage of the superior quality of Semet-Solvay Foundry Coke in reducing your melting costs.

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**ALLIED CHEMICAL & DYE CORPORATION**
*40 Rector Street* — *New York 6, N. Y.*
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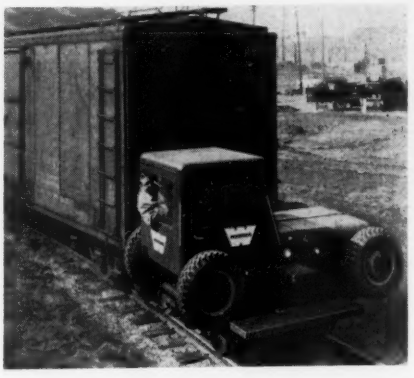
*In Canada:* SEMET-SOLVAY COMPANY, LTD., Toronto
*Western Agent:* WILSON & GEO. MEYER & CO., San Francisco

*For Better Melting*


pull of 12,800 lb. Performance is made possible by a constant pressure hydraulic jack which lifts the car slightly and transfers some of its weight to the tractor. Unit can operate on either track or road. By



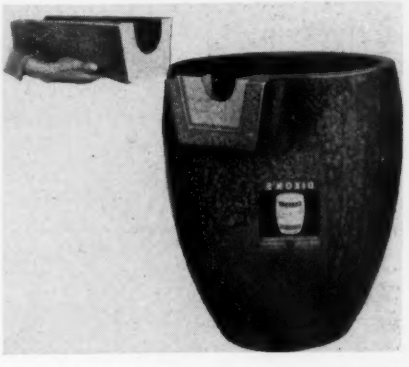
retracting its four pneumatic-tired road wheels when the unit is as ride tracks, it is ready to roll on its steel rail wheels. All controls are within reach of driver.

**For More Details Circle No. 530—Page 347**

## Crucibles★

**feature attachable pouring lips that are leakproof**

Joseph Dixon Crucible Co., Jersey City, N. J.—Tilting crucibles for ferrous and nonferrous melting feature an interlocking joint between the crucible and lip for placing a detachable pouring spout. Interlocking



design is said to provide a leakproof joint. Other advantages claimed are high joint strength, smooth pouring, fast installation and long service life.

**For More Details Circle No. 531—Page 347**

## Insulating Castable

**gives trouble-free protection from temperatures to 3000° F**

Norton Co., Worcester 6, Mass.—Insulating castable provides insulation against temperatures up to 3300° F in applications such as backup for kilns and furnaces, pit furnace linings and high-temperature burner ports. Material is light weight and monolithic in structure, having

Once again ... the

# BIG ADVANCEMENTS COME FROM WHEELABRATOR®

*in Blast Cleaning Developments*

NEW AND REVOLUTIONARY

SEE it on the stage at the FOUNDRY SHOW

## WHEELABRATOR®

# SUPER TUMBLAST

*provides*

**SUPER SAVINGS** in cost of operation

**SUPER TIGHT** machine construction

**SUPER SAVINGS** in cost of maintenance

**SUPER CAPACITY** blasting wheel

**WHEELABRATOR CORPORATION**

505 S. BYRKIT STREET MISHAWAKA, INDIANA

*World's Largest Builders of Airless Blast Equipment*

an aluminum oxide content of about 96 per cent. Material is shipped in moisture-proof 100-lb bags.

For More Details Circle No. 532—Page 347

## Potentiometer-Recorder

**of the null-balancing type is completely self-contained**

Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill.—Electronic potentiometer-recorder of the null-balancing type is available in wide range of models which measure, indicate, control and give a permanent record of such variables as speed, temperature, strain, pH and other quantities that can be resolved into electrical signals.

For More Details Circle No. 533—Page 347

## Electric Vibrators★

**feature eccentric weights for adjusting vibrations**

Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland 13, O.—Bin vibrators feature interleaving eccentric weights that permit vibration adjustment to suit the job. Weights may be closed into a semicircle, giving maximum force, or opened into a three-quarter circle for minimum vibration. Various sizes are adaptable to settings ranging from 140 to 2250 lb of impact.

For More Details Circle No. 534—Page 347

## Fork Lift Trucks★

**of 2000-5000 lb capacity incorporate many new features**

Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich.—Redesigned line of fork lift trucks incorporates new features, including 12-v electrical system, fully automatic transmission, emergency fuel tanks, foam rubber seats, automobile-like controls, self-adjusting brakes, balanced swing-up hood, solid tire models with drive and steer wheels of same diameter, combination lift-tilt controls on steering column, optional radiator screens for dusty operations and all-purpose deep-tapered forks. Gas models range from 2000 to 5000 lb capacity. Electric and gas models of higher capacity will be manufactured soon.

For More Details Circle No. 535—Page 347

## Muller★

**can handle 3000 lb or 45 cu ft of material per batch**

National Engineering Co., 549 West Washington Blvd., Chicago 6, Ill.—Muller has a rated capacity of 3000 lb or 45 cu ft of material per

Now in operation, this new production foundry is operating continuously over two 8 hour shifts, employs 2,000 workers and is pouring 1000 tons of gray iron every 16 hours. Cores and molds are baked and dried in Despatch Ovens.

**DESPATCH OVEN FEATURES**

***Increased Production***—100% convection heat and up to 75% recirculated air give speedy warm up, fast heat recovery after reloading and fast baking.

***Quality Baking***—Heavy duty, high volume fans give speedy heat transfer, assure uniform baking.

***Approved Control***—Despatch ovens are equipped with automatic temperature controls and fire underwriter approved safety systems.

***Efficient Operation***—Direct gas or oil fired heaters cut fuel costs . . . for more information about Despatch Foundry Ovens . . .

*Write for Bulletin 31, or request a representative call.*

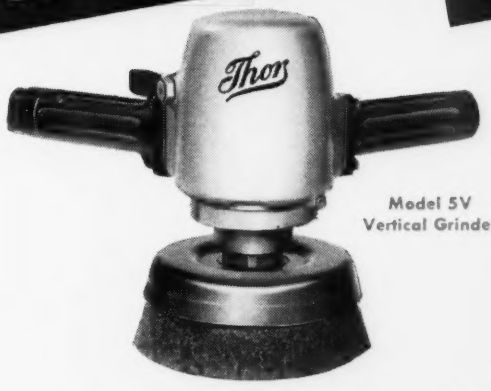
Minneapolis Office: 619 S.E. 8th St. Chicago Office: 4534 N. Broadway
Sales and Service in all Principal Cities

DESPATCH OVEN COMPANY

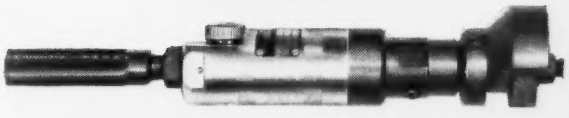
PIONEERS IN ENGINEERING HEAT APPLICATIONS FOR INDUSTRY

# NEW! THREE THOR AIR GRINDERS

**Power stepped up!** **Weight cut down!** **Fewer parts!**




Model 5V
Vertical Grinder



Model 25G Die Grinder

Series 3G Grinders for Castings

All three of these brand new additions to Thor's complete grinder line represent distinct progress in power, in weight reduction, and design improvement. All have thumb-type throttle control.

### Model 5V Vertical Grinder

This new Thor 7½-lb. vertical grinder is available in three basic speeds — 4,500, 6,000, or 8,000 r.p.m. It accommodates sanding discs to 9″ diameter, depressed center wheels to 7″ diameter, and cup wheels or wire brushes to 6″ diameter. Power has been increased 50%; quiet exhaust; 4-position throttle.

### Model 25G Die Grinder

Designed for use with a 1¾″ bonded wheel in die work and other production operations, this new Thor Model 25G weighs only 2 lbs., 37% less than its Thor predecessor, yet it develops 23% more power! Model 25G also has 35% fewer parts. Speed: 20,000 r.p.m.

Thor
PORTABLE POWER
TOOLS

### Model 3G Series for castings

Available in speeds of 7,000, 10,000, 15,000, and 18,000 r.p.m., this new Thor Series 3G takes wheel sizes from 1½″ to 3″, depending on speed. Here, again, the weight has been cut to 3 lbs., 11 oz., a saving of 16%, while power has been increased 18%. Also available in Series 3GE with an extension spindle to reach hard-to-get-at places.

Thor's complete line of air, universal electric, and high frequency electric grinders includes sizes, speeds and capacities for every industrial need. Thor also offers a complete line of grinder accessories. Thor Power Tool Company.

**THOR POWER TOOL COMPANY, Aurora, Ill.**

Atlanta • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Denver • Detroit • Houston • Los Angeles • Milwaukee • Newark • Long Island City, N.Y. • Philadelphia • Pittsburgh • St. Louis • San Francisco • Seattle • Toronto, Canada • Export Division, New York City

One of two Lectromelt Furnaces at Valley Steel Casting Company

38,715 pounds of steel were poured to produce this automotive die block at Valley Steel Casting Company, Bay City, Michigan.

# Cast 16-ton die block with two Lectromelt* Furnaces of 9-ton combined capacity

***One heat was poured from each furnace, with a touch up heat for the risers.***

Careful planning by Mr. Samuel S. Fair, Plant Manager, and Mr. George W. Barker, Chief Melter, preceded the casting of this block, said to be the largest commercial electric steel casting ever produced in Michigan. Every facility of the melting department had to be coordinated so that both furnaces could be tapped simultaneously and one quickly recharged, so that a "touch up" heat could be melted for the risers.

The Lectromelt Furnaces gave their usual excellent performance—quick turnaround, with top quality steel.

Lectromelt Furnaces are built sturdily to take such pushing for production; you see the results with lower upkeep costs. And while you're crowding on the power, Lectromelt's pinpoint control lets you hold analyses to exacting specifications.

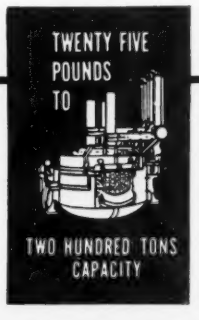
Catalog 9-A describes these furnaces. For a copy, write Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in... GERMANY: Friedrich Kocks GMBH, Dusseldorf... ENGLAND: Birlec, Ltd., Birmingham ... FRANCE: Stein et Roubaix, Paris ... BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege ... SPAIN: General Electrica Espanola, Bilbao ... ITALY: Forni Stein, Genoa ... JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*



THE
Standard
OF
QUALITY

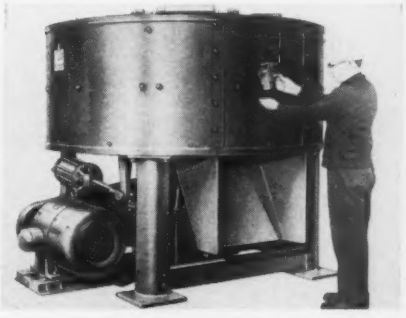
SCIENTIFIC
Pressure Cast
MATCH PLATES

Cordial greetings to you —foundrymen and pattern makers. We hope you enjoy the convention and we are looking forward to seeing you at our booth —#311. It will be a pleasure to renew old friendships and make new acquaintances. Bring your friends.

The
SCIENTIFIC
CAST PRODUCTS
Corp.

1390 East 40th St., Cleveland 3, Ohio
2520 West Lake Street, Chicago 12, Ill.

batch. Powered by a 60-hp motor and V-belt drive, the muller has a 90-in. pan diam and uses spring-loaded mullers to provide an effective mul-



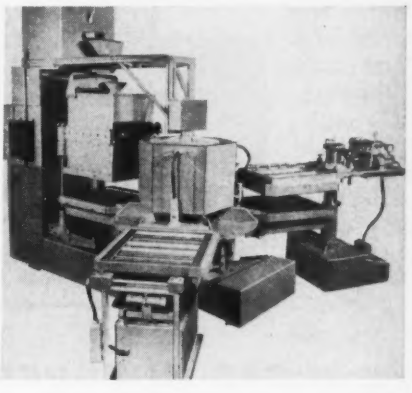
ler weight range of 1200 to 3000 lb. Crib measures 33 in. in height and has a renewable steel liner, segmented and replaceable wear plates, built-in material sampler and removable section for maintenance and removal of mix components. Liquid additions are made through a perforated spray pipe around the inner periphery of mixer crib.

For More Details Circle No. 536—Page 347

## Shell Molding Unit★

**is designed to produce 120 cured shells per hour**

Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Three-pattern, rotary-indexing shell molding machine indexes patterns to vari-



ous stations for investment, curing and shell stripping. All functions are controlled automatically and individual pattern investment time, investment temperature and curing time are controlled separately. Unit is designed to produce 120 24 x 30-in. shells per hr.

For More Details Circle No. 537—Page 347

## Synthetic Hose

**can be used at elevated temperatures and high pressures**

H. K. Porter Co., 342 Madison Ave., New York 17, N. Y.—Lightweight hose of synthetic materials reportedly can be used at temperatures up

7 things to remember about
BLASTRITE
SHOT AND GRIT

QUALITY
EFFICIENCY
ECONOMY
LONG WEAR
CAREFUL SCREENING
PROPER ALLOYING
LABORATORY CONTROL

AVAILABLE IN ALL SIZES

Ask for our new catalog No. AB-53

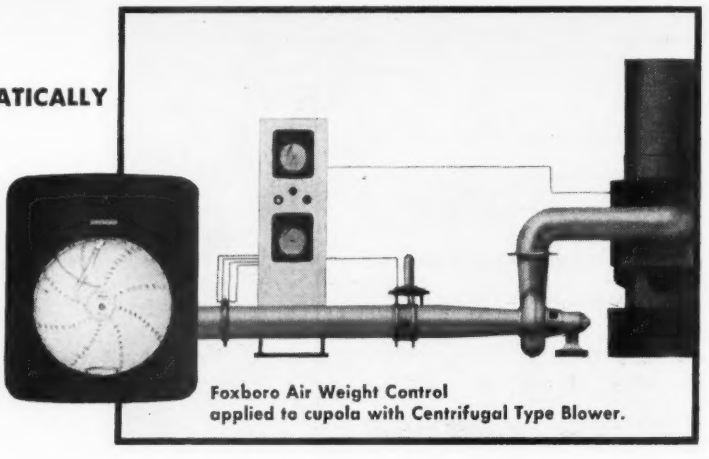
ABRASIVE SHOT & GRIT CO., INC.
SPRINGVILLE, N. Y.
Telephone Springville 1

# POUR BETTER CASTINGS—AND SAVE

## IMPROVE CUPOLA EFFICIENCY — AUTOMATICALLY

***. . . with Foxboro Air Weight Controllers***

Performance-proved in more than 1500 successful applications! These popular Foxboro Controllers automatically "weigh" air for cupola blast . . . provide right amount of oxygen for best combustion regardless of weather conditions. Results: higher quality castings, greater productivity . . . fuel savings and less pigging. **Write for Bulletin 10-10.**



Foxboro Air Weight Control applied to cupola with Centrifugal Type Blower.

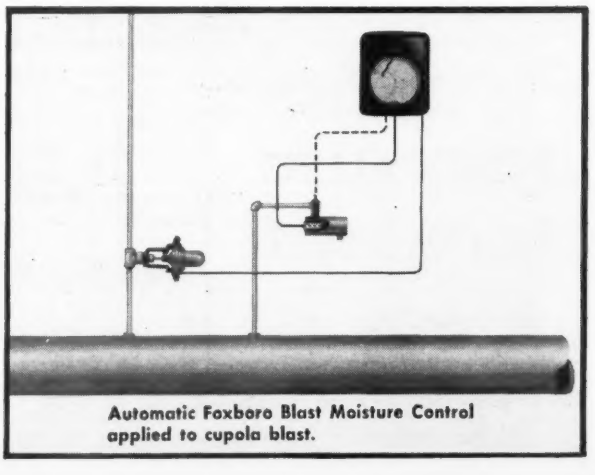
## SEE THESE PROGRESSIVE INSTRUMENTS

### CONTROL BLAST MOISTURE — IT PAYS!

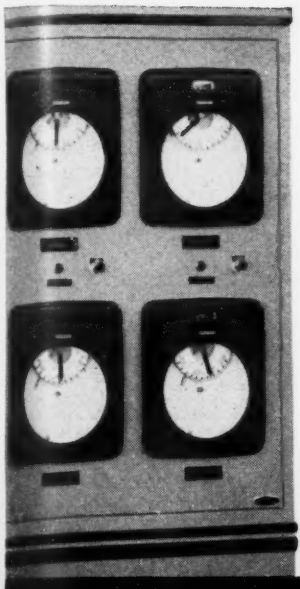
***. . . with Foxboro Dew Point Recorders and Controllers***

These Foxboro Instruments, with the exclusive Dewcel* measuring element, reduce coke waste and "cold metal" pours. Dew Point Recorders provide a foolproof basis for modifying the formula under varying humidity conditions. Dew Point Controllers automatically compensate for blast moisture variations on long-run heats. **Write for Bulletin 11-11 and Data Sheet 330-1.**

*Reg. U. S. Pat. Off.



Automatic Foxboro Blast Moisture Control applied to cupola blast.



FROM CUPOLA BLAST CONTROL to automatic foundry operation, Foxboro-engineered instruments and control systems yield cost savings . . . better castings . . . greater efficiency. Your nearby Foxboro Field Engineer will show you why — and how. Or write us for details on the instruments and control systems shown below. The Foxboro Company, 325 Neponset Ave., Foxboro, Mass., U.S.A.

# . . . with Foxboro Complete Foundry Instrumentation

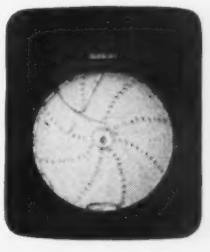
### BAKE CORES MORE UNIFORMLY

***. . . under Foxboro Core Oven Control***

Here's automatic assurance of better, more uniform cores from both batch and continuous type ovens. A wide variety of electric and pneumatic Foxboro Temperature Controllers in recording as well as indicating models, is available for all types of heating systems and ovens.

### STOP CUPOLA TROUBLES BEFORE THEY START

***. . . with Foxboro Windbox Pressure Recorders***



These "trouble-shooting" recorders give operators a continuous record of cupola conditions . . . show up clogged tuyeres, bridging, fine coke sizes, etc. They're dependable, accurate, troublefree performers. Write for **Bulletin 6-10.**

## IN BOOTH 906, ATLANTIC CITY, MAY 3 - 9

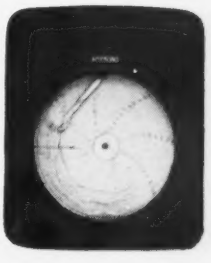
### OTHER FOXBORO EFFICIENCY BOOSTERS

Blast Pressure Recorders
Automatic Temperature Controllers for Pre-Heaters
Pressure Controllers for Exhaust Systems
Temperature Protection for Fans and Dust Collectors
Temperature Controllers for Auxiliary Start-Up Heaters

FOXBORO
Reg. U.S. Pat. Off.

### "PIN-POINT" CONTROL OF MULTI-ZONE FURNACES

***. . . with Foxboro Multi-Record, Multi-Point Controllers***



Each instrument provides electric control of as many as 6 temperature points, recording them on a single round chart! This means top economy for zone type annealing ovens and heat treating furnaces. Foxboro also makes other types of controllers, both electric and air-operated. Your nearby Foxboro Field Engineer will be glad to suggest equipment to suit your particular needs.

## COMPLETE FOUNDRY INSTRUMENTATION

to 400° F and working pressures of 100 psi. It can be made with inside diameters of from ¾ to 5 in. in lengths up to 50 ft.

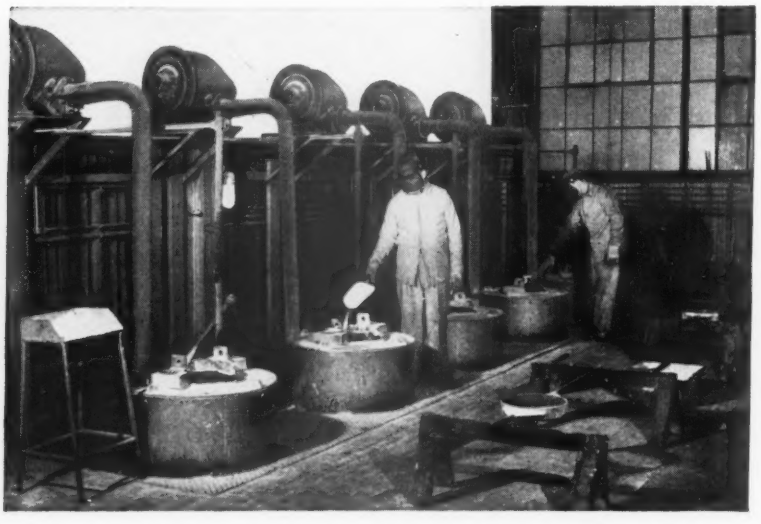
For More Details Circle No. 538—Page 347

## Electric Furnace★

**has electrodes that are pedestal-mounted and motor-driven**

Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich.—Electric furnace of 700-lb capacity features pedestal-mounted electrodes that are completely motor driven. A ⅛-hp, direct-current motor is clutch-connected to the lead screw to operate the left-hand electrode under automatic control. Three-phase, ⅛-hp, alternating current motors are direct-connected to both electrodes for manual pushbutton control to remove and replace electrodes while charging or to adjust arc position during automatic operation. All switches, pushbuttons and indicating lights are contained in a single box which can be placed at any convenient location.

For More Details Circle No. 539—Page 347

*Nonferrous Melting with . . .*

**SPENCER TURBO-COMPRESSORS**
HARTFORD

There are many methods of melting non-ferrous metals but the accepted standard for furnishing air to Oil and Gas fired furnaces is the Spencer Turbo-Compressor. A battery of Spencer 5 HP turbos in the foundry of a large Chemical plant is shown above.

Thirty-five years ago the Spencer Turbo was first specified by a furnace manufacturer. Today it is the first choice of all of the leading furnace and oven manufacturers.

The reasons they prefer Spencer are the absolute reliability—perfect performance and low maintenance over long years of almost continuous service. Spencer Turbos range in size from 35 to 20,000 cu. ft. per min., 4 oz. to 10 lbs. and 1/3 to 1,000 HP. For complete description of the standard and special Turbos ask for Bulletin No. 126-A.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

494-N


## Air Grinder★

**is light weight but powerful and can do a variety of jobs**

Thor Power Tool Co., Aurora, Ill.—Air grinder features an adjustable, positive-speed governor which increases air economy and assures

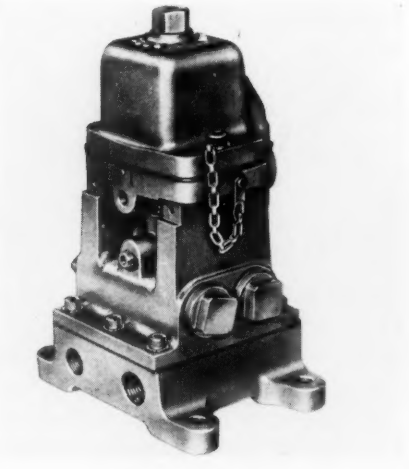
safety under all operating conditions. Noise is muffled with a built-in exhaust. Grip handles are spaced 110 degrees apart to aid operator convenience and increase efficiency. Other features include automatic mist oiling, double-row preloaded spindle bearings and hardened steel center plates. Accessories convert the tool from a vertical cup grinder to a sander, wire brush machine or depressed center, disc-wheel cutoff grinder.

For More Details Circle No. 540—Page 347

## Solenoid Valves★

**feature specially designed protective power units**

Ross Operating Valve Co., 107 East Golden Gate Ave., Detroit 3, Mich.—Solenoid valves and cover units built to J. I. C. standards have



foundry applications on conveyors and machines for testing for leaks in castings, as well as many others. Unit is for use on all the company's base-mounted introld valves and can be applied to three-way and four-way types and to sizes from ¼ through 1¼ in. Assembly protects the solenoid from dust, splashing liquids and airborne contaminants;

# Do you really know your foundry production costs?

There *is* a practical way to compare your cost figures with the most progressive foundries in your area . . . to put your breakdown of departmental costs next to theirs to see where you may be out of line. Of course, identities are not necessary, so they are not revealed. Begin now to learn the up-to-date methods others have used to bring production costs more in line.

You can do this by joining a *Local Cost Group* sponsored by the Gray Iron Founders' Society. Progressive gray iron foundries are associated through 19 of these groups which meet quarterly in industry centers throughout the United States.

Regional cost consultants manage respective area cost groups and serve as your confidential C. P. A. on costs. For full information, check the coupon below and mail it to the Society immediately.

**HOW TO OBTAIN ACCURATE JOB COSTS**

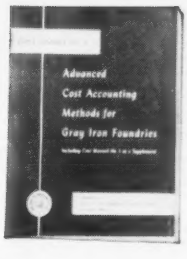
Job costs for operating a sandslinger, roll-over, core-blower and other modern equipment must be figured differently than when these were hand operations. If you are still using simplified job cost methods after acquiring such modern equipment, your cost figures may be inaccurate.

To learn the most advanced cost methods, you should have a copy of the new *Cost Manual No. 2*, developed by a committee of foundry executives. Every foundry, large or small, will discover in this practical manual an easy and accurate way of bringing accounting practice up to date. This new manual describes *advanced cost methods* for gray iron foundries, and it also includes as a supplement the *basic cost system* as presented in *Cost Manual No. 1*. The coupon below is for your convenience.

**We'll be in Booths No. 131-133 to answer questions at . . .**
**The 60th Castings Congress and Show, Atlantic City, May 3-9.**

## GRAY IRON FOUNDERS' SOCIETY

*Make it better with Gray Iron*




GRAY IRON FOUNDERS' SOCIETY, INC.
National City-East 6th Building, Cleveland 14, Ohio

Please send us:

- ☐ Literature on *Cost Manual No. 2*.
- ☐ Full information about the nearest Local Cost Group.
- ☐ Complete facts about other Society services.

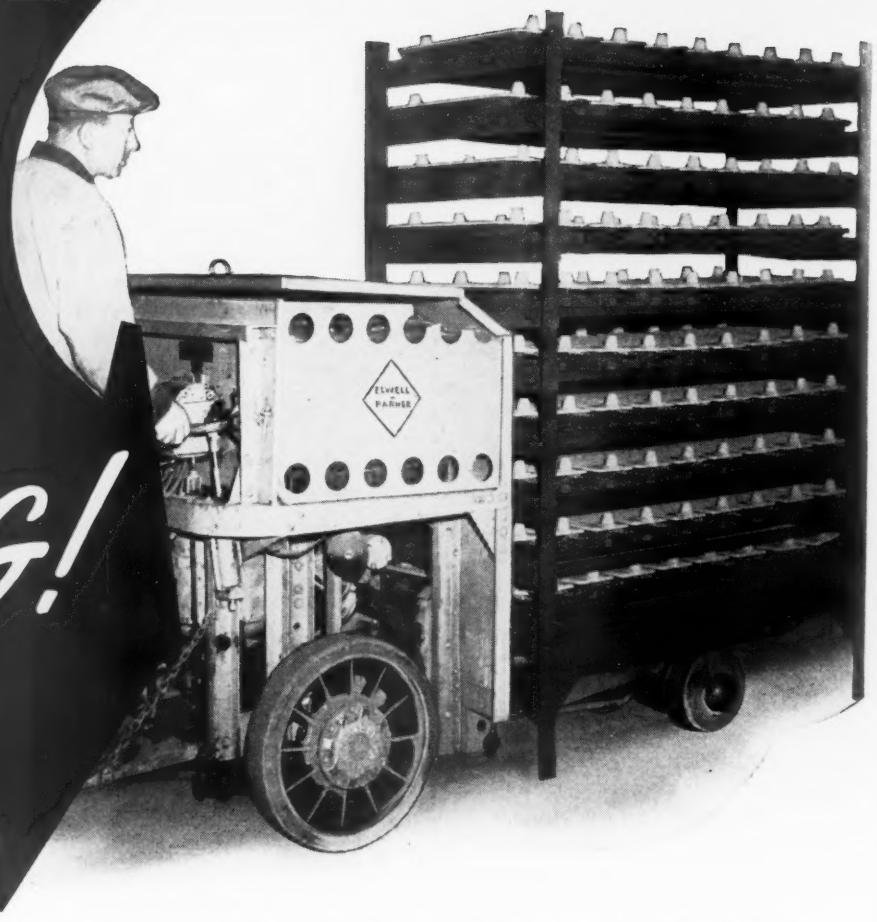
Name _____

Address _____

Title _____

Company _____

# 36 YEARS YOUNG!



Way back in 1920, this Elwell-Parker truck began operating in a prominent Canadian foundry. It had to transport racks of cores directly into core ovens where heat reached 400°. Even under such gruelling usage, the truck is still *serving daily!* Time and manpower saved have repaid truck's cost over and over.

*This same* BUILT-IN DEPENDABILITY *is available to you in the modern Elwell-Parker.*

***Handling Cores..."Like Handling Fresh Cookies."***

That's how this foundry describes fragile, unbaked cores that can't stand jarring in transit. But breakage is kept to a minimum by the electric truck's easy starts, smooth acceleration and gentle stops—all features of Elwell-Parker truck performance.

E-P trucks for foundries have specially designed lift and travel acceleration to protect cores. Yet fast operation saves heat when exchanging green and baked cores. Vital parts are dust-proofed.

For *more* years of reliable service, make your next truck the finest by ordering from The Elwell-Parker Electric Co., 4313 St. Clair Ave., Cleveland 3, Ohio.

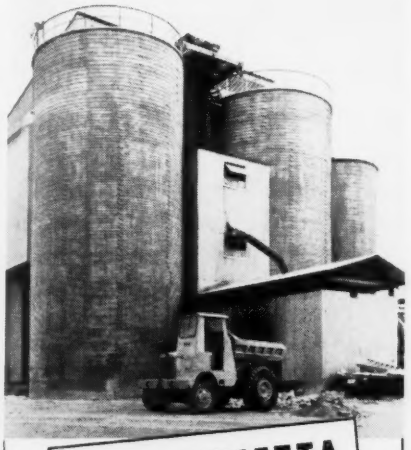
***NEW General Catalog***
**describes all E-P trucks in detail. Write for your copy *NOW*.**

## NEWER ELWELL-PARKERS IN THIS FOUNDRY

Now this firm has a *fleet* of E-P trucks because they have paid off with two major benefits: (1) In spite of increased volume, faster handling by trucks has considerably offset need for costly plant expansion; (2) Mechanized handling has freed many men for more productive work.

**ELPAR**
**INDUSTRIAL TRUCKS**

## Cut Material Wastes and Handling Costs



with a **MARIETTA** STORAGE SYSTEM Designed to your needs

Inefficient storage and handling of bulk materials runs costs up and production down. Let Marietta help you turn this cost factor into a profitable operation with a storage and handling installation engineered to the job.

Adaptable Marietta concrete silos will handle storage of any material from lump coal to core sand, chemicals, fly ash and etc. Their pre-cast solid or Air Cell concrete stave construction is sturdy . . . durable . . . fireproof. Moisture-resistant interiors eliminate costly waste or spoilage. Marietta storage silos are built with an extra strength factor for mounting any type of intake, discharge or materials handling equipment.

Whether you require 1 or 40 units . . . a complete new system or an addition to your present capacity . . . it will pay you to consult Marietta.

**DON'T FIGHT SHORTAGES**
**Use Marietta concrete stave silos.**

Write for informative booklet on how Marietta plans, engineers and erects modern storage-handling systems for industry.

THE Marietta CONCRETE CORPORATION
Marietta, Ohio
40 YEARS OF LEADERSHIP AND SERVICE

BRANCH OFFICES: Baltimore 21, Md., Charlotte 6, N.C., Nashville, Tenn., Jamestown, N.Y.

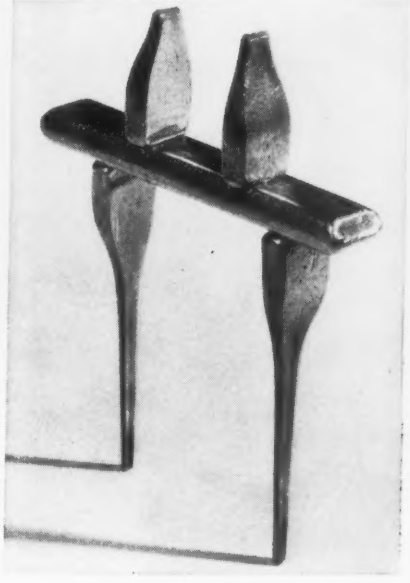

it can be operated manually without removing the cover and becomes inoperative electrically when the cover is removed.

For More Details Circle No. 541—Page 347

### Chills★

**provide added chilling surface and chilling volume**

Standard Horse Nail Corp., New Brighton, Pa. — Increased chilling surface and chilling volume have been incorporated into company's



spider chills. Clean, bright finish or coppered chills are available in a wide range of sizes. Made from special quality mild steel, manufacturer reports the chills are engineered to provide increased chilling efficiency at low cost.

For More Details Circle No. 542—Page 347

### Synchronous Motor

**in ratings from ¼ to 40 hp is built on standard frames**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.—Synchronous motor for general use is available in ratings from ¼ to 40 hp, is built on standard induction motor frames and enclosures. Motor requires no brushes, slip rings or windings on the rotor, separate source of direct-current excitation or special starting equipment. Frequencies of 300 cycles and speeds above 10,000 rpm are available.

For More Details Circle No. 543—Page 347

### Optical Pyrometer★

**is versatile instrument for laboratory or plant use**

Pyrometer Instrument Co., Bergenfield, N. J.—Optical pyrometer has been designed as a multipurpose instrument for use in laboratories as


SHAMVA®

## the SUPERIOR mullite refractory

- Highest quality, pure alumina base
- Calcined at 3250°F. for maximum stability and crystal development
- High fusion point—minimum impurities
- Excellent resistance to most slags
- Superior resistance to thermal shock
- Excellent load capacity at high temperatures
- Uniform thermal expansion
- Consistent high quality at economical prices

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SPECIAL SHAPES
MORTARS
RAMMING MIXES
CASTABLES
PATCHES
PLASTICS

THE MULLITE REFRACTORIES CO.
SHELTON 4, CONNECTICUT

**At the dry sand pile,** the 15 cu. ft. capacity Michigan 12B consistently comes up with heaping bucket-loads like this. Bigger loads, faster cycles produce more tonnage.

*Michigan 12B handles 300 tons of sand daily . . .*

# Chicago foundry formerly needed 2 loaders to keep up with muller—now does it with one

Until a few months ago, a Chicago gray iron foundry required two industrial tractor shovels to load sand into the muller and distribute it to the molding stations. One loader couldn't keep up with the muller, so the second loader was needed during peak periods. When the management decided to replace their oldest loader, they requested on-the-job demonstrations of leading makes. After they had seen them all, they bought a Michigan 12B. *It was the only machine which could keep up with the muller.*

## Handles 300 tons of sand per day

The principal job of the 15 cu. ft. Michigan is sand handling. Round trips from the muller to the molding stations average about 300 ft. through narrow aisles and supporting columns. The 12B actually handles about 300 tons of sand per day: loads 105 tons into the muller, distributes 75 tons to the stations (the balance goes by over-

**Fast bucket action:** approaching the muller hopper, the operator steps on the brake, automatically puts the transmission in neutral, diverts full engine power to the bucket action.

*(Advertisement)*

head crane into a sand slinger) and brings back 105 tons of burned-out sand to the pile. The 12B just "walks" into the heavy, lumpy pile, works the bucket and comes out with a heaping load. With its power-shift transmission, the 12B gets in and out fast, saves vital seconds on every cycle.

## Loads out refuse

An overhead conveyor dumps refuse into a corner of the plant. During its free time, the 12B loads out the refuse, piles it in the yard for removal by a contractor's power-shovel. This refuse is *extremely rugged stuff*—miscellaneous junk, waste sand and burned-out cores. Even here the 12B, with its 3-to-1 torque converter and powerful bucket action, brings out heaping bucket-loads.

## Why they bought the Michigan

The management group agreed that the Michigan was "simply more machine for the money"—20 percent heavier and more powerful than most machines in its class. The 12B is the only Tractor Shovel in its size-range with a power-shift transmission—eliminates the clutch pedal and engine clutch. The 12B has a planetary-wheel drive axle—takes 70% of the torque load off the axle shaft, virtually eliminates broken axles. Air and oil filters prolong engine and transmission life.

## How to buy a tractor shovel

During its on-the-job demonstration, the 12B clearly proved its ability to *move more tonnage* at less cost. Make your own comparison: don't buy an industrial Tractor Shovel until you've seen the Michigan 12B in action. Write now to arrange a demonstration—you name the job!

Michigan is a registered trade mark of

CLARK® EQUIPMENT

**CLARK EQUIPMENT COMPANY**
**Construction Machinery Division**
**2475 Pipestone Road**
**Benton Harbor 26, Michigan**

**Digging heavy refuse** to move it outside, the 12B demonstrates its ability to dig where other machines just spin their wheels.

**Low-level bucket action** at the muller gets heaping bucket-loads fast; big loads and fast power-shifted cycles enable the 12B to keep up with the muller at peak production.

**Good visibility** with a full load—the operator carries the bucket low. Note how the operator's left hand rests conveniently on the power-shift lever.

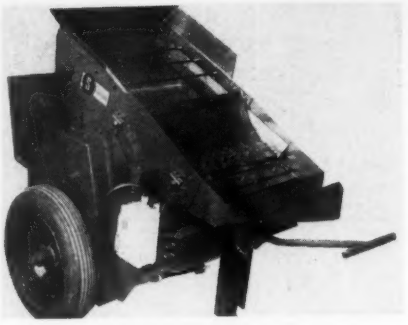
well as for general plant use in measuring temperatures. Machine can be used as a hand-held telescope or mounted on a table top or floor type tripod. Unit has focal distance adjustments from 5 in. to infinity. Three wide overlapping scale ranges from 1300 to 5800° F cover almost every temperature measurement problem.

For More Details Circle No. 544—Page 347

## Sand Conditioner★

**is portable and moves easily over uneven or sand floors**

Simplicity Engineering Co., Durand, Mich.—Compact, 2 x 3-ft portable sand conditioner screens, aerates and fluffs foundry sand in one operation. Unit reportedly will handle 10 to 15 tons of sand per hour or all the sand two men can shovel. Sand is fed directly on the screen. Hard core butts, chills, gaggers and nails pass over the screen, under the lump-breaker into the vibrating scrap chute and are fed into a receptacle on one side. Sand falls on a vibrating chute and is conveyed to the aerator from where it is thrown in heaps. Distance to be thrown and height of the heap are regulated by an adjustable hood over the aerator. Unit is equipped with large pneumatic tires to facilitate movement on uneven and sand floors.



For More Details Circle No. 545—Page 347


Special extra length Thermocouple shown at right. Write for price list.

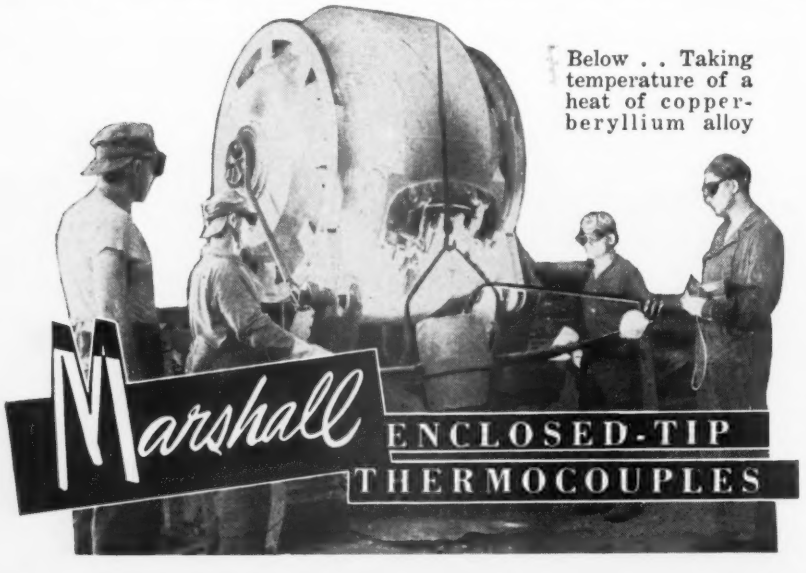
At left are shown standard Ladle and Furnace type Marshall Thermocouples.

# "YARDSTICK TO CASTING QUALITY"

In nonferrous casting, temperature of molten metals must be measured often to assure solid, good quality castings.

Here is where Marshall Enclosed-Tip Thermocouples safeguard your foundry operations. They report metal temperatures quickly, accurately, thus assuring that castings are poured at exactly the right heat.

Your foundry probably is already using Marshall Thermocouples. They're in use throughout U.S. and Canada. Thermocouples come in Ladle and Furnace types. Also obtainable in special extra lengths. Send for descriptive literature. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, O.




Below . . Taking temperature of a heat of copper-beryllium alloy


## Phenolic Resins★

**are used for either hot or cold coating of foundry sands**

Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.—Four phenolic resins are for coating sand used in making shell molds and shell cores. Three are for cold coating and the fourth is for hot coating. Any four may be used on sand from which molds or cores are to be blown. Two are equally suitable for conventional dump box methods. Advantages claimed are elimination of dusting, improved flowability, excellent blowability, economy, nonsegregation of resin and sand during storage and handling and adaptability to efficient shell molding techniques.

For More Details Circle No. 546—Page 347

## Drum Faucet

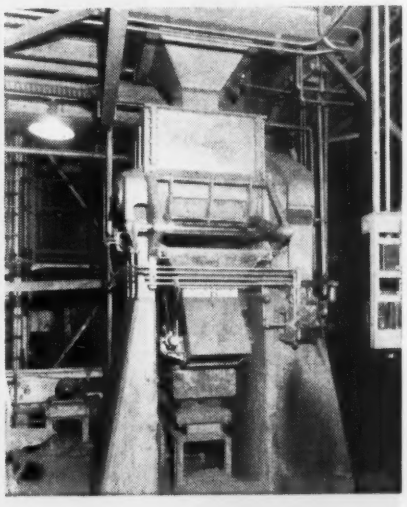
**is designed for the safe control of flammable liquids**

Protectoseal Co., 1920 South Western Ave., Chicago 8, Ill.—Drum faucet can be used with any type container that has a ¾-in. bung opening. Faucet is said to be leakproof, self-positioning and self-closing. Swivel head permits faucet to be screwed into bung opening and when a firm, tight, threaded connection is secured, the pouring spout is swivelled to correct position for use and tightened with a knurled locking nut. Locking nut compresses a tef-

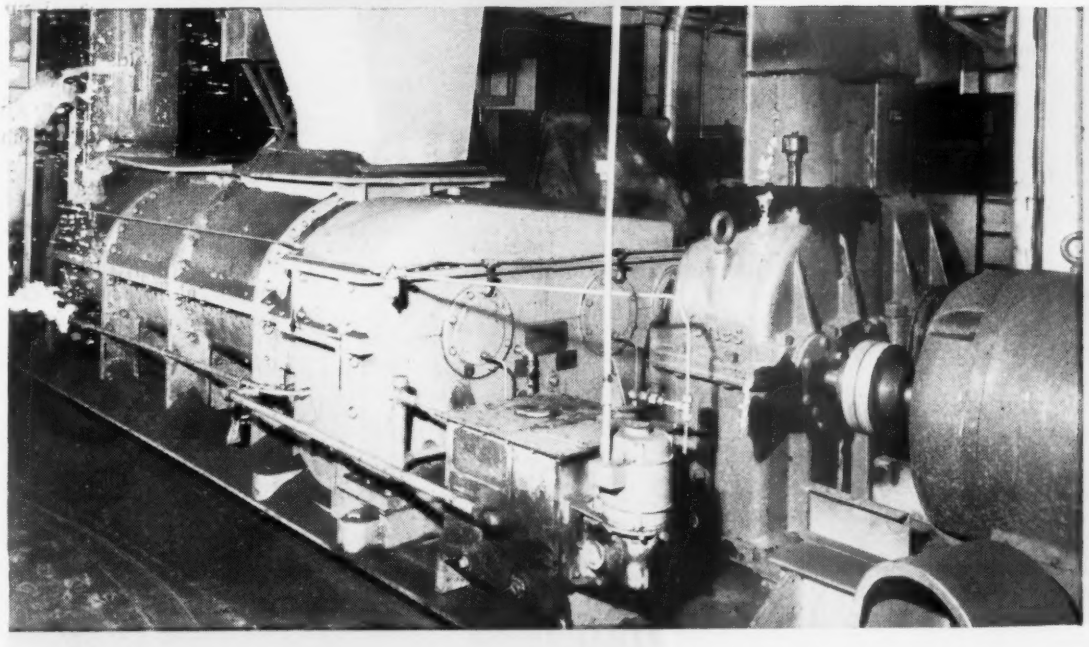
# 8 BAKER PERKINS UNITS

**handle the sand mulling, core wash mixing, core paste mixing and refractory clay mixing in big new foundry**

The eight Baker Perkins units installed in this new automotive grey iron foundry were chosen for their industry-proven excellence and efficiency. For sand mulling, five B-P 5A Continuous Molding Sand Mullers assure high speed delivery of thoroughly uniform sand mix to the molding floor. The B-P core paste mixer and B-P core wash mixer insure good core surfaces, and the B-P Refractory Clay Mixer is ideal for mixing refractory clay material for mudding up ladles and cupolas. This new foundry will find, as other foundries have found, that B-P equipment is built to last and requires minimum maintenance.



**On the job . . . a size 15 B-P Refractory Clay Mixer**



**One of five B-P 5A Continuous Molding Sand Mullers installed in the new plant.**

## BAKER PERKINS INC.

**CHEMICAL MACHINERY DIVISION, SAGINAW, MICHIGAN**



*For more information, use Reader Service Card, page 347*

SEE OUR
NEW BABY

ATLANTIC CITY EXHIBIT
May 3-9 Booth #1438

SOMETHING NEW IN SAND RECLAMATION!

AIR-RECLAIM

MAKES OLD SAND
WORK LIKE NEW...

Put your waste sand into production! Eliminate costly time consuming non-productive operations!

Put costly sand back to work! Our new AIR-RECLAIM converts your sand waste into PROFIT! No limit to the possibilities for AIR-RECLAIM in any plant. More efficiency for all foundries . . . large and small.

Reclamation is our business
. . . NOT A SIDE LINE!

Our sand reclamation units are engineered to suit your needs. Foundrymen can depend on HYDRO-BLAST installations to cut your maintenance costs, save time, lessen sand breakage loss, and give you more productive sand.

IT'S THE SPIN THAT DOES THE JOB!
FOUNDRY SAND
AIR-RECLAIM
RECLAMATION EQUIPMENT

"Reclamation is our business
. . NOT A SIDE LINE!"

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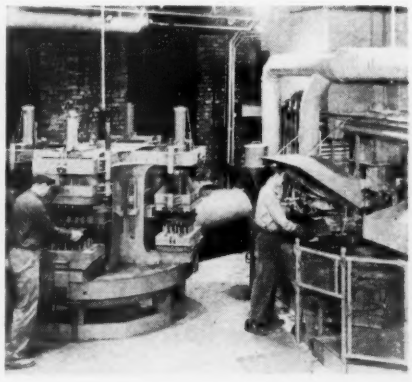
lon-asbestos packing composition to prevent leakage at the connection and provide leakproof dispensing.

For More Details Circle No. 547—Page 347

## Shell Mold System★

**is engineered to produce 240 shell molds per hr**

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.—Automatic shell molding system is said to be capable



of producing 240 shells per hour. Units in the system are a four-station rotary shell molding machine, a belt conveyor at the core setting station, closing machine and trolley conveyor for the finished shells. Machine will handle plates up to 20 x 30 in., making a mold 15 x 20 in. Copes and drags are made on same pattern plate. Machine will handle different patterns at each of its four stations, but pattern plates must be of the same size.

For More Details Circle No. 548—Page 347

## Rotary Table Feeder★

**has discharge capacity of 0-14 tons of granular material**

Newaygo Engineering Co., Newaygo, Mich.—Rotary table feeder is designed to provide core and mold

blowing machines, shell molding machines and other molding units with an accurate and constant supply of sand. Diameter of plate is 36 in. Dis-

# AUSTIN-WESTERN HYDRAULIC CRANE

# *Speeds Handling Jobs*

## *Increases Production—Decreases Cost*

**ONE-MAN OPERATION—FULL HYDRAULIC—ALL-WHEEL DRIVE AND STEER—CONTINUOUS 360° BOOM ROTATION**—Yes, no other materials handling unit can give you this remarkable combination of operational features.

Until you see an A-W in action, you won't believe that it is possible for one machine to be so *thoroughly versatile* and so *completely adaptable* on so *many jobs.*

Today, more than ever before, the success of your operation depends entirely on your ability to cut cost, slash downtime, increase output per manhour, and your one *sure way* is with an Austin-Western Hydraulic Crane.

Arrange for a demonstration in your plant and yard or on your job—call your Austin-Western distributor now.

No matter what the assignment, the versatility of your Austin-Western Hydraulic Crane will pay off in *more work* at *less cost.*

**You name it, A-W will do it.**

**AUSTIN-WESTERN WORKS**
Construction Equipment Division · Baldwin-Lima-Hamilton Corporation
AURORA, ILLINOIS, U.S.A.
Power Graders • Motor Sweepers
Road Rollers • Hydraulic Cranes

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**60th AFS Castings Congress & Show**
**ATLANTIC CITY, MAY 3-9**

# Reduce Replacement Costs with Acme

- DIE CAST POTS
- MELTING POTS
- INGOT MOLDS

Melting non-ferrous metals? You'll save with Acme melting pots and ingot molds. They require less frequent replacement because they're cast from a special iron formula that combines strength with the ability to withstand high temperatures. They improve production, too, because they're designed for even distribution of heat without hot spots. More than 30 years' experience in this field is your assurance of high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

*Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.*

**Acme FOUNDRY CO.**

2502 22nd St. • DETROIT 16, MICH. • *Phone* TAshmoo 5-2404

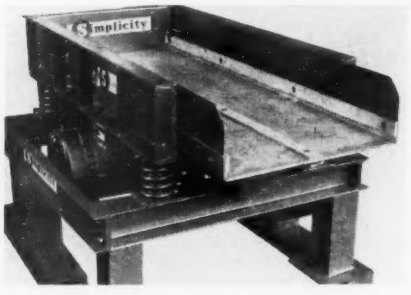

charge capacity ranges to a maximum of 14 tons of prepared sand or other granular material. Changes in the feed rate can be made instantaneously while the unit is operating and can be done either at the unit or by remote control by the operator.

For More Details Circle No. 549—Page 347

## Oscillating Feeders★

**feed heavy column loads along their entire length**

Simplicity Engineering Co., Durand, Mich.—Oscillating feeders are designed to handle heavy column




loads that can be fed along the units' entire length and allow use of a larger bin, thus eliminating the problem of material bridging in the bin. Feeders may be suspended with spring and cable arrangement from bin above or may be spring mounted. Liners are replaceable and can be provided with grizzly or screen section, one or two decks and can be enclosed.

For More Details Circle No. 550—Page 347

## Refractory Gun★

**is for high-speed, long-life, free-flow, economical operation**

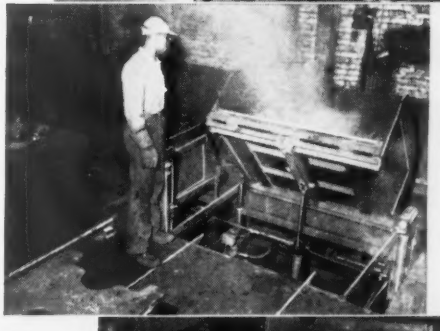
Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 North Wacker Dr., Chicago

6, Ill.—Refractory gun is designed for high-speed, long-life, free-flow, low-cost performance with complete control over feed speed, air-to-material

# NOMAD

## "SMOOTH-FLOWING ACTION"

**PALLET RAISER**



**means**

- **INCREASED PRODUCTIVITY**
- **REDUCED MANPOWER**
- **ECONOMY OF SPACE**
- **REDUCED SCRAP**
- **LOW COST MODERNIZATION**

Nomad Track and Pallet Systems provide a cycle of molds and mold handling equipment. Molds are set on roller equipped pallets, "rolled away" on conveyor track and poured. The molds are moved to the Mold Dump and dumped. Pallets then roll onto the lower return track automatically returning to the molding end of the conveyor where the Pallet Raiser lifts the pallet into position ready to receive the next mold.

This Pallet Raiser to Mold Dump and Return Cycle reduces the number of men required to dump molds and stack equipment, provides more work area, and eliminates arduous, back-breaking strain. The man on the job is fresher and has a higher hourly output. The Nomad compact, space-saving layout results in greater efficiency and profit-making production. It's low cost modernization!

Mold handling mechanism and pallets pat.

**See me at**

**BOOTH 1443**

**MAY 3-9** CONVENTION HALL
ATLANTIC CITY, N. J.

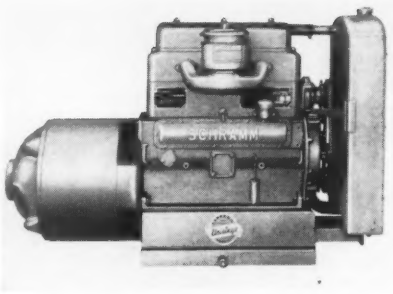
**MOLD DUMP**

**NOMAD**
FOUNDRY EQUIPMENT

**WESTOVER CORPORATION**
**NOMAD EQUIPMENT DIVISION**
3110 W. FOND DU LAC AVE. • MILWAUKEE 10, WIS.

rate and material velocity. Gun will handle damp or dry materials and can be set to handle special materials recommended for the upper range of cupola or for basic refractories.

For More Details Circle No. 551—Page 347



## Compressors★

**provide air for a multitude of common foundry operations**

Schramm Inc., West Chester, Pa.—Electric motor-driven compressors with cooling unit are designed to provide air for chipping, cleaning, grinding, drilling, operating hoists and lifts, sand rammers, vibrators and molding machines. Units delivering 85 cfm and over are jacketed for liquid cooling. Units delivering less than 85 cfm are cooled by air blast. All compressors have mechanical intake valves, long-life discharge valves, gear type pump lubrication and multicylinder construction with interchangeable parts between sizes. Any source of rotative power can be used as a drive.

For More Details Circle No. 552—Page 347


# Want core plates that SAVE MONEY?

## . . . then use TRANSITE CORE PLATES for easy handling, low maintenance, long life!

You get real long term economy with Transite* Core Plates. Their initial cost is low . . . and their maintenance cost negligible. Transite Core Plates are tough and corrosion-resistant. They are made from an asbestos and cement composition by a special Johns-Manville process. They resist shock and corrosion . . . will not crack or break easily.

Here are other important reasons for using Transite Core Plates:

**THEY SPEED PRODUCTION—** Transite Core Plates are easily handled. They're simple to clean, too, since core wash, sand, etc. do not adhere to them as readily as to other core plate materials.

**THEY MAINTAIN ACCURACY—** Foundrymen who have used Transite Core Plates for years report minimum warpage.

For cores of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 60, New York 16, New York.

*Reg. U. S. Pat. Off.

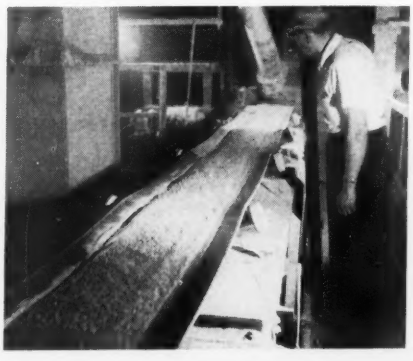
## Johns-Manville TRANSITE CORE PLATES

Made of Asbestos


## Conveyor Belt★

**remains pliable and elastic at temperatures up to 350° F**

B. F. Goodrich Co., Industrial Products Division, Akron, O.—Heat-resistant rubber conveyor belt is said to remain pliable and elastic when exposed for long periods to the baking action of hot materials at temperatures up to 350° F. Construction reportedly permits efficient service from mechanical belt splices. Belts are available in a choice of fabric reinforcement which includes glass fabric, rayon-nylon, rayon, cotton-nylon and cotton.



For More Details Circle No. 553—Page 347

## Ramming Mix

**is for lining electric high-frequency induction furnaces**

Electro Refractories & Abrasives Corp., Buffalo, N. Y.—Ramming mix contains fused magnesia and alumina and is for use in lining electric high-frequency induction furnaces for melting stainless and other high-nickel and alloy steels. Material is available in several types having varying magnesia contents and grain sizes for different applications.

For More Details Circle No. 554—Page 347

## Portable Lift

**may be used as a straddle-fork, elevator or shop crane**

Oster Mfg. Co., Box 4326, Cleveland 32, O.—Telescoping portable lift of 1000 lb capacity may be used as a straddle fork, portable elevator or shop crane. Manually propelled

# LET US TELL YOU ABOUT OUR OPERATION

Fifty years of experience with engineers' drawings has developed the Pyle "foundry technique" of pattern layout. This wealth of knowledge is backed by superior craftsmanship to deliver patterns of unsurpassed accuracy.

Patternmaking at Pyle may not embrace all the drama of surgery . . . but pinpoint precision and devotion to detail are just as important here as in the operating room.

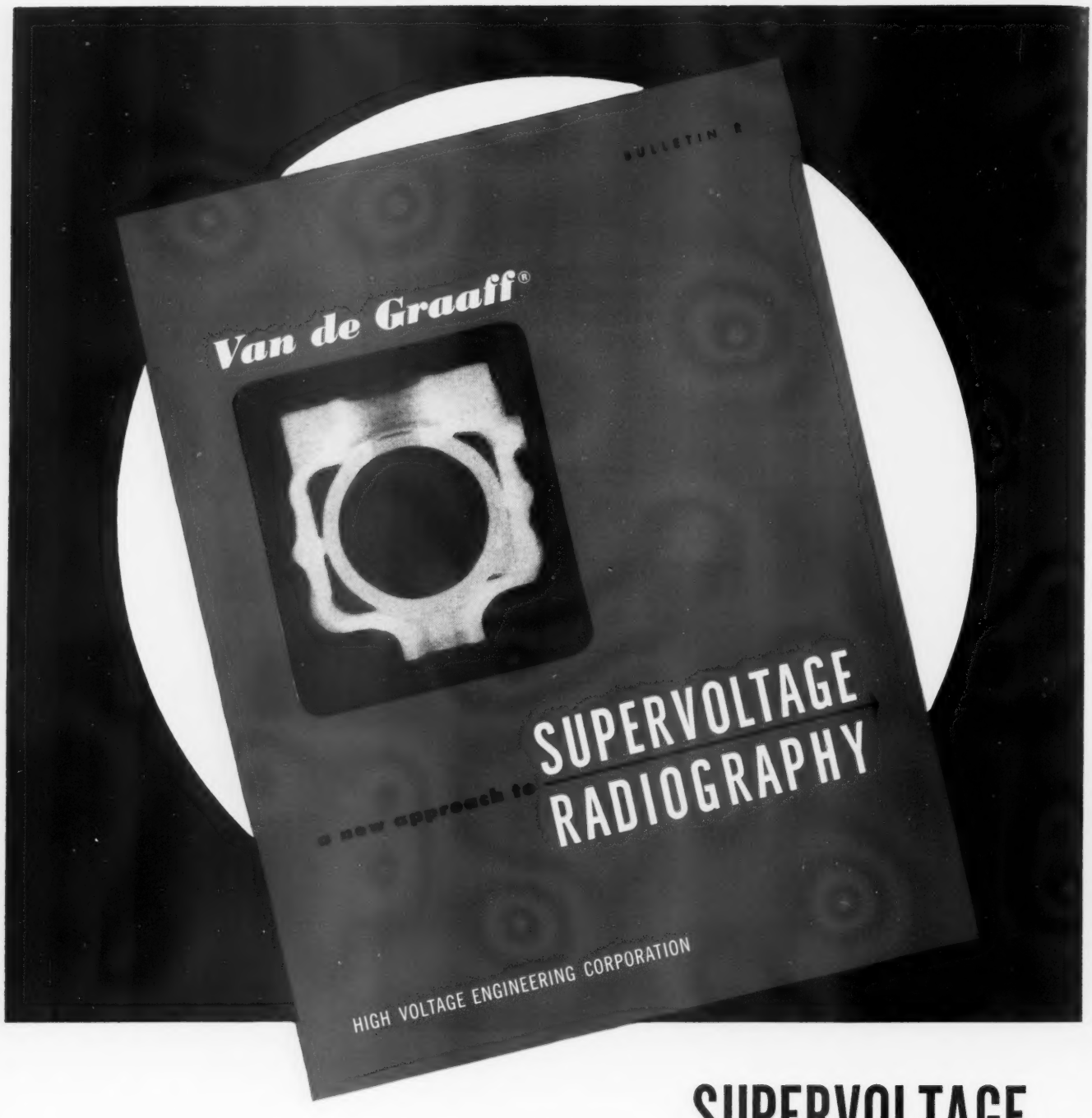
At Pyle your pattern is prepared by men averaging 19 years experience. From a minutely accurate wooden model, it is cast in our own foundry — designed, equipped and operated exclusively for pattern production. The aluminum or magnesium casting is then tooled on machines best suited to your needs . . . lathes, radial drills, milling machines, planers, hydraulic or automatic duplicators. Flawlessly hand-finished and meticulously inspected, it is shipped to meet your deadline.

The consistent thoroughness of our operation has won us friends among America's most respected firms. May we become friends with you?

**PYLE**

**PATTERN AND MANUFACTURING COMPANY**

Muskegon, Michigan




## Here's up-to-the-minute information on high-quality SUPERVOLTAGE RADIOGRAPHY

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- *case histories from various industries*
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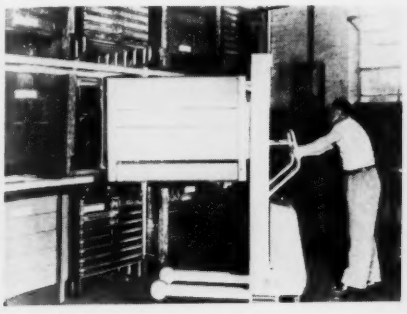
**HIGH VOLTAGE ENGINEERING CORPORATION**

7 UNIVERSITY ROAD CAMBRIDGE 38, MASSACHUSETTS

by one man, the unit features a battery-powered full lift of 112 in., but has a collapsed height low enough for operatiton in rail cars and highway trucks, elevators, under balconies or other low headroom areas.



Overall height is 78¼ in., length 52 in., width 37 in., straddle capacity 30 in., turning radius 60 in. and weight 986 lb.

For More Details Circle No. 555—Page 347

## Respirator Hoods

**are said to provide complete protection from dust and spray**

Industrial Products Co., 2827 North Fourth St., Philadelphia 33, Pa.—Respirator hood weighs 11 oz and is designed to give complete head pro-

tection on jobs and operations involving dust and spray. Replaceable, die-cut plastic window allows normal, unrestricted vision. Zipper encircles window frame and allows cloth hood to be removed for washing. Hoods are interchangeable and can be purchased separately. Hoods may be worn with or without correction glasses.

For More Details Circle No. 556—Page 347

## Truck Cranes

**feature power hydraulic controls and clutches**

Link-Belt Speeder Corp., Cedar Rapids, Iowa—Five truck cranes have lifting capacities ranging from


ON ACCO product

# ACCO Registered* Sling Chains

NEW!
Shaped Section Master Link
Holds its form under loads up to 18% greater.
NEW!
Accoloy X-Weld 125 Chain
Welds as strong or stronger than alloy material. Welded area 2¼ times conventional size area.

*Trade Mark Registered

## NOW—Better and Safer than Ever!

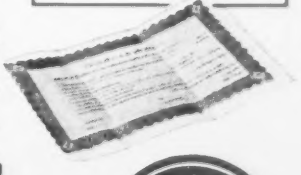
• ACCO *Registered* Chain Slings—long recognized as the standard of excellence—now give users a double bonus of safety and quality. They incorporate ACCO's new Shaped Section Master Link plus ACCO's sensational Accoloy X-Weld 125 chain.

The new Shaped Section Master Link, without any increase in weight, withstands deformation under loads up to 18% greater than a standard round section can. And the Accoloy X-Weld 125 chain—with its extra-strong, king-size welded area and its non-kinking feature—assures extra ruggedness and better service.

Because of these two spectacular improvements, there is more reason than ever for standardizing on ACCO *Registered* Slings. For additional interesting information, call your ACCO *Registered* Distributor—or write our nearest District Office.

**WHAT "ACCO REGISTERED" MEANS . . .**

1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling



ACCO

American Chain Division

AMERICAN CHAIN & CABLE

TRADE MARK

York, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

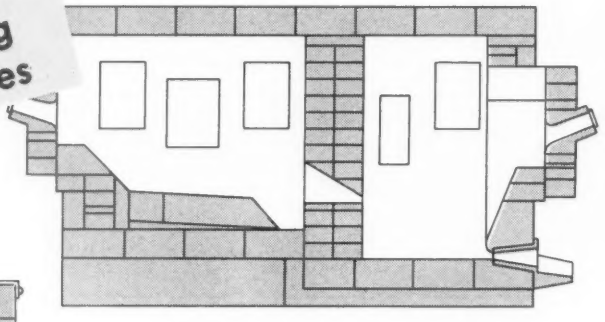
plus Rings Links Hooks

With the world's most complete refractories service

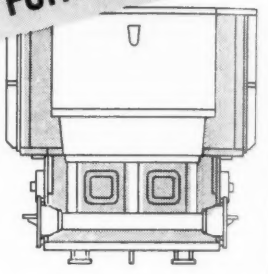
# HARBISON-WALKER

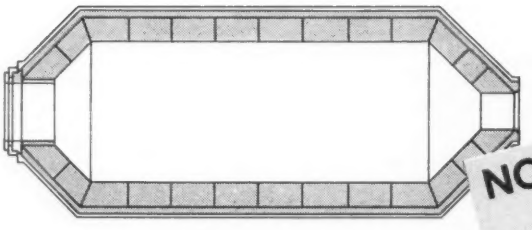
offers the widest range for your selection

ALUMINUM Melting Furnaces



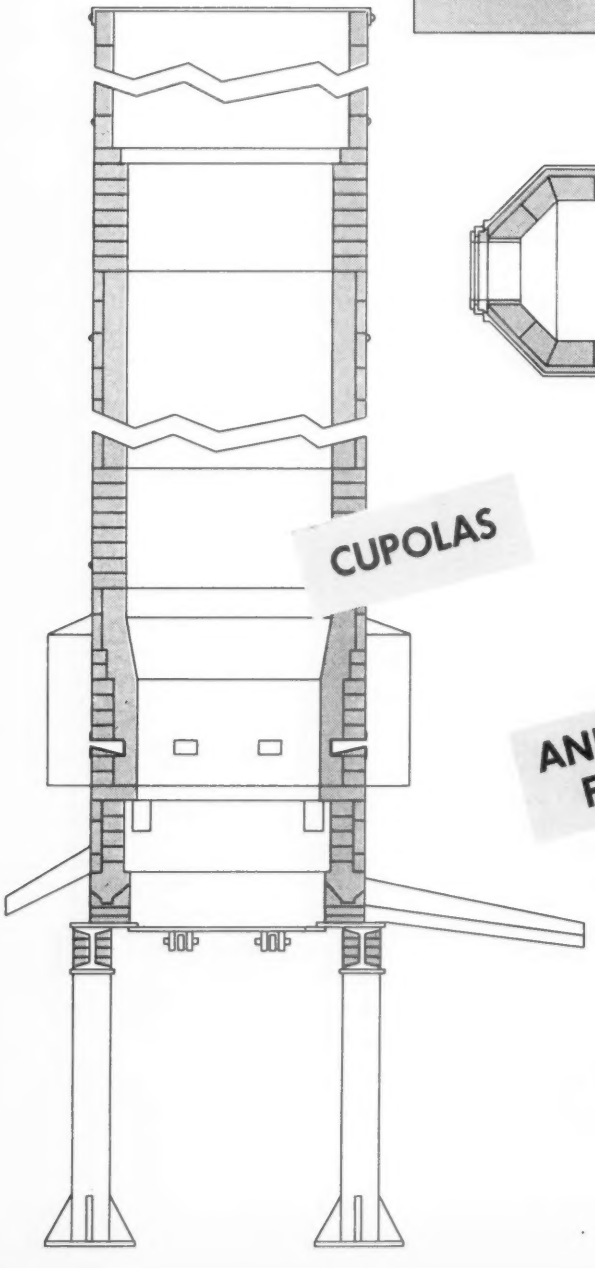
INDUCTION Furnaces



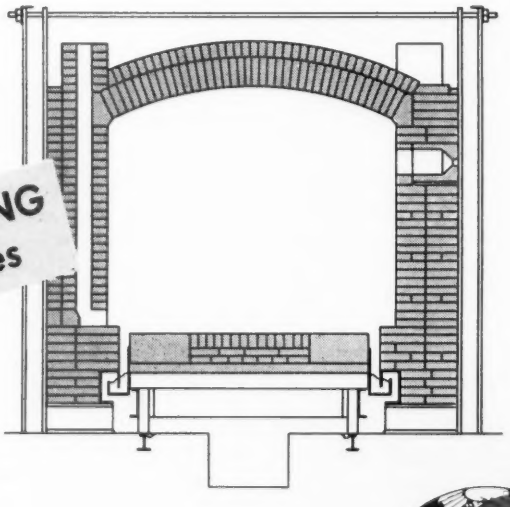


NON-FERROUS ROTARY Furnaces

CUPOLAS

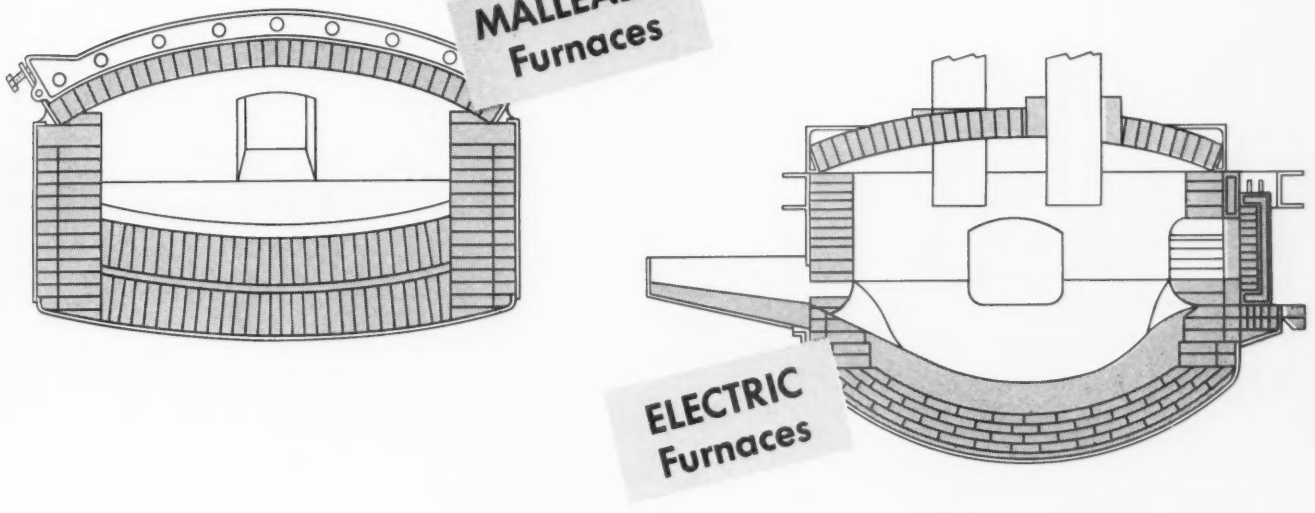


ANNEALING Furnaces



THE best balanced choice for every specific requirement can be made from the complete range of types and classes of foundry refractories, produced by Harbison-Walker.

Technical service is freely offered to assist in the selection and use of the refractories that will assure longest service-life and greatest over-all economy in any application.




**CUPOLAS** Harbison-Walker cupola refractories comprise various brands of brick and monolithic materials especially adapted for this service. Included among these are all classes of alumina-silica and basic brick, H-W KUPLOMIX for monolithic linings and H-W EXTRA STRENGTH CASTABLE for maximum wear resistance in the charging zones. H-W BLACK PATCH plastic refractory is used extensively for the bottom zone and for ladle linings.

**ELECTRIC STEEL MELTING FURNACES** Some of the Harbison-Walker products widely preferred for electric furnaces are STAR and VEGA (super-duty) silica brick, ALAMO (super-duty fire clay), H-W MULLITE and ANCHOR (60% alumina) brands, H-W MAGNESITE, MAGNEX and METALKASE brick and H-W C-MIX and MAGNAMIX for monolithic bottoms.

**ANNEALING and HEATING FURNACES** All the different classes of fireclay brick and cements, castables and all the various classes of insulating fire brick are furnished by Harbison-Walker for every requirement.

**MALLEABLE FURNACES** Some H-W brands which are favored for malleable furnaces include super-duty fireclay brick (ALAMO from Mo., BOONE from Ky., DEAN from Pa. and H-W SUPER SAVAGE from Md.), ANCHOR 60% alumina and ANKORITE mortar. KORUNDAL (90% $Al_2O_3$), CORALITE (80% $Al_2O_3$) and H-W MULLITE (70% $Al_2O_3$) are used with good economy for certain extremely severe conditions.

**NON-FERROUS METAL FURNACES** These comprise many different designs and involve a great variety of operating conditions for which a wide range of different refractories are used. H-W brands are available in all the kinds needed.

**MOLDING ACCESSORIES** For many years Harbison-Walker has specialized in the manufacture of materials for molding purposes. Some of these products are H-W MOLDSAND BOND, CALAMO for investment molds, ceramic molding media and gate runner brick.

**HARBISON-WALKER REFRACTORIES CO.**

AND SUBSIDIARIES

*World's Most Complete Refractories Service*

**GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA**

NOW, USE THIS SANI-MISTER FREE...

FIGHT ATHLETE'S FOOT WITH SANI-MIST the new sanitary way

**Makes Foot Baths and other methods obsolete!**

AND PEOPLE LIKE TO USE SANI-MIST, because it "refreshes" their feet. It's so clean and sanitary . . . as personal as your own toothbrush. Kills athlete's foot fungi in 30 seconds with no chance of dilution or contamination.

You buy only the Sani-Mist Solution, the spray dispenser is leased at no charge for as long as you use Sani-Mist. Write today for the name of your Sani-Mist dealer.

**SANI-MIST INC.**
**Dept F• 1724 Chestnut St.**
**Philadelphia 3, Penna.**

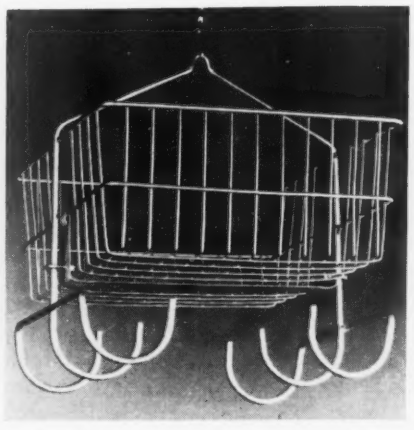

12½ to 35 tons. All models feature power hydraulic controls as well as power hydraulic operated clutches that are self-compensating for heat and normal lining wear. All cranes are mounted on carriers with full-floating walking beam rear axle supports that allow travel over uneven terrain. Screw-type outrigger jacks and pontoons and removable rear outriggers are available.

For More Details Circle No. 557—Page 347

## Locker Baskets

**store clothes near ceiling in space normally unused**

Moore Co., 1036 Quarrier St., Charleston, W. Va.—Overhead locker basket is for storage of clothing and



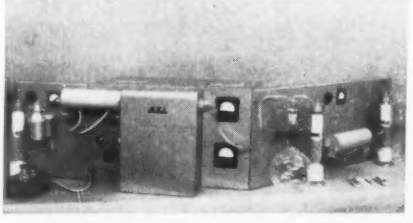
personal effects of employees in foundries and industrial plants. Basket with chain, pulleys, pulley supports and locking assembly raises contents to the ceiling where they are stored in normally wasted space. A locking arrangement securely locks clothing in the unit.

For More Details Circle No. 558—Page 347

## Gas Analyzer

**for hydrogen and carbon makes determinations in 5 minutes**

National Spectrographic Laboratories Inc., 6300 Euclid Ave., Cleveland 3, O.—Gas analyzer for analysis



of hydrogen and carbon uses macro-combustion by high-frequency furnace to reduce determination time of hydrogen to five minutes in zirconium, titanium, steel and other metals. Accuracy is commensurate


rejects are cutting your profits

**REDUCE YOUR REJECT PERCENTAGE WITH PROVEN**

**PARASPRAY**

Profit-conscious foundrymen produce more perfect castings per labor dollar with PARASPRAY.

Down goes your reject rate as PARASPRAY deoxidizes the mold cavity atmosphere and stabilizes moisture content. Quick-drying PARASPRAY prevents costly blows, kicks and rat-tails . . . gives a s-m-o-o-t-h finish.

Use PARASPRAY—the modern surface and mold atmosphere conditioner for greater profits.

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5200 River Road
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**FOUNDRY RUBBER, INC.**

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# Norbide® Pressure Blast Nozzles

THERE'S a NORBIDE Nozzle available to give you exactly the type of cleaning stream you need — from a broad stream for large areas to a pencil-thin stream for cleaning small openings. And NORBIDE Nozzles — lined with the hardest manufactured material commercially available — maintain stream contour, last longer than any other nozzle made and deliver maximum blasting efficiency at minimum cost per hour.

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**NORTON COMPANY, 43 New Bond St., Worcester 6, Mass.**

NORTON®
BORON CARBIDE

**NORBIDE®** . . . *The Longest Nozzle Life You Can Buy*

with vacuum fusion but with negligible down-time for production control. It determines hydrogen in concentrations as low as 0.0002 per cent.

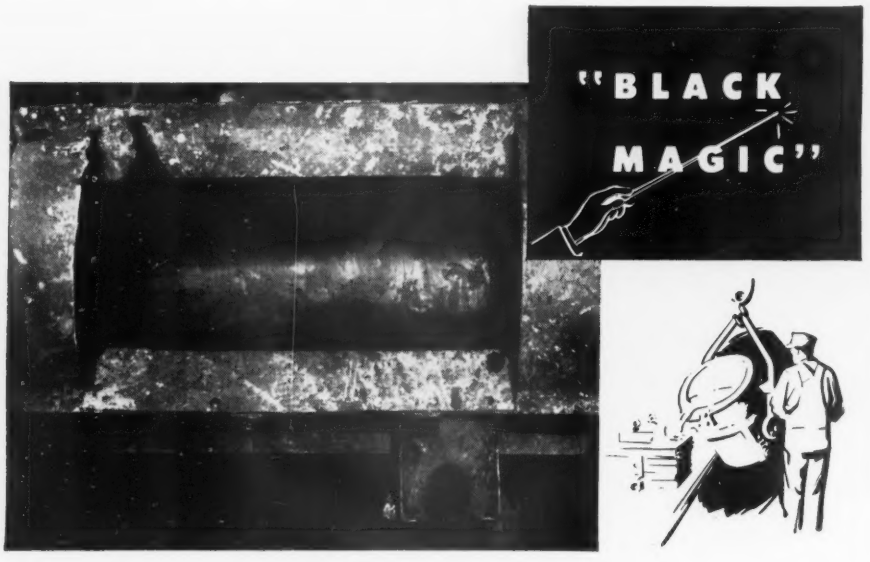
For More Details Circle No. 559—Page 347

## Epoxy Resin

**can be used to make low cost tools, dies, molds and fixtures**

Minnesota Mining & Mfg. Co., Chemical Products Group, 900 Fauquier Ave., St. Paul 6, Minn.—Epoxy resin can be used for fabrication of high-temperature tools, dies, molds and fixtures. At temperatures up to 400° F, the strength of tools made from the resin is sufficient to permit pressure curing of thermosetting resins, rubber molding, molding of reinforced plastics and injection molding. Resin is a two-component system. One part is a moldable composition of fine particles and a binding resin from which complex pattern surfaces may be molded into a preform. Other part is a thermosetting resin with which the molded preform is impregnated and cured.

For More Details Circle No. 560—Page 347


**WALSH GRAFLOK PLASTIC WORKS WONDERS IN YOUR LADLE LININGS**

"Locking" out the destructive affects of metal oxides and slags for greatly increased service life is the feat performed by Walsh Graflok Plastic Ladle Lining.

**ADVANTAGES:**

**Easier Flow of Metal • Reduces Wear on Lining • Graphite Lubricating Effect Cuts Slag Adherence—Makes Removal Easier • Slashes Refractory Cost Per Ton of Metal Melted**

**USES:**

- Receiving and Mixing Ladles
- Bull Ladles, Hand Ladles—All Types Foundry Ladles
- Spouts of Cupolas and Malleable Iron Furnaces
- Tap Holes, Slag Holes and Cupola Wells
- Nozzle Wells of Bottom Pour Ladles
- Hot Metal Troughs and Runners
- Lining of Cupola Front Slagging Spouts

Walsh also makes—Graflok Ladle Coating. In dry form, in 100 lb. waterproof bags, ready for immediate use by the addition of water.

Packed in 100 lb. waterproof cartons—ready for use—sliced for ease in handling and in dry form for operators preferring plastic consistency. Packed in 100 lb. water proofed bags, for mixing with water on job.

*WRITE FOR FREE GRAFLOK BULLETIN*

WALSH REFRACTORIES CORPORATION — America's Best Clays

**WALSH REFRACTORIES CORP.**

**101 Ferry Street • St. Louis 7, Missouri**

**For over 60 years manufacturers of high grade refractories**


## Rotary Files

**are packaged in sets for convenient identification**

Grobet File Co. of America, Carlstadt, N. J.—Rotary files are boxed in sets in wood boxes with transparent plastic tops for convenient identification. Boxed sets include a

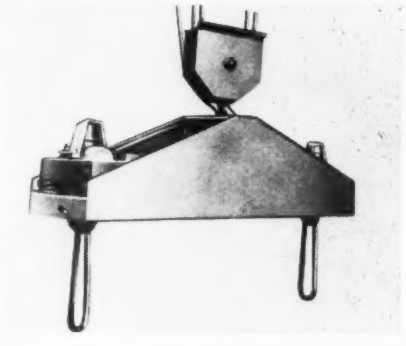
variety of shapes and sizes, ⅛ or ¼ in. shanks, in chisel cut and ground-from-solid types, made from high-speed steel as well as carbide.

For More Details Circle No. 561—Page 347

## Shakeout Device

**provides mobility and eliminates slow, tedious manual handling**

Syntron Co., 540 Lexington Ave., Homer City, Pa.—Vibrating shakeout crane beams provide a method of



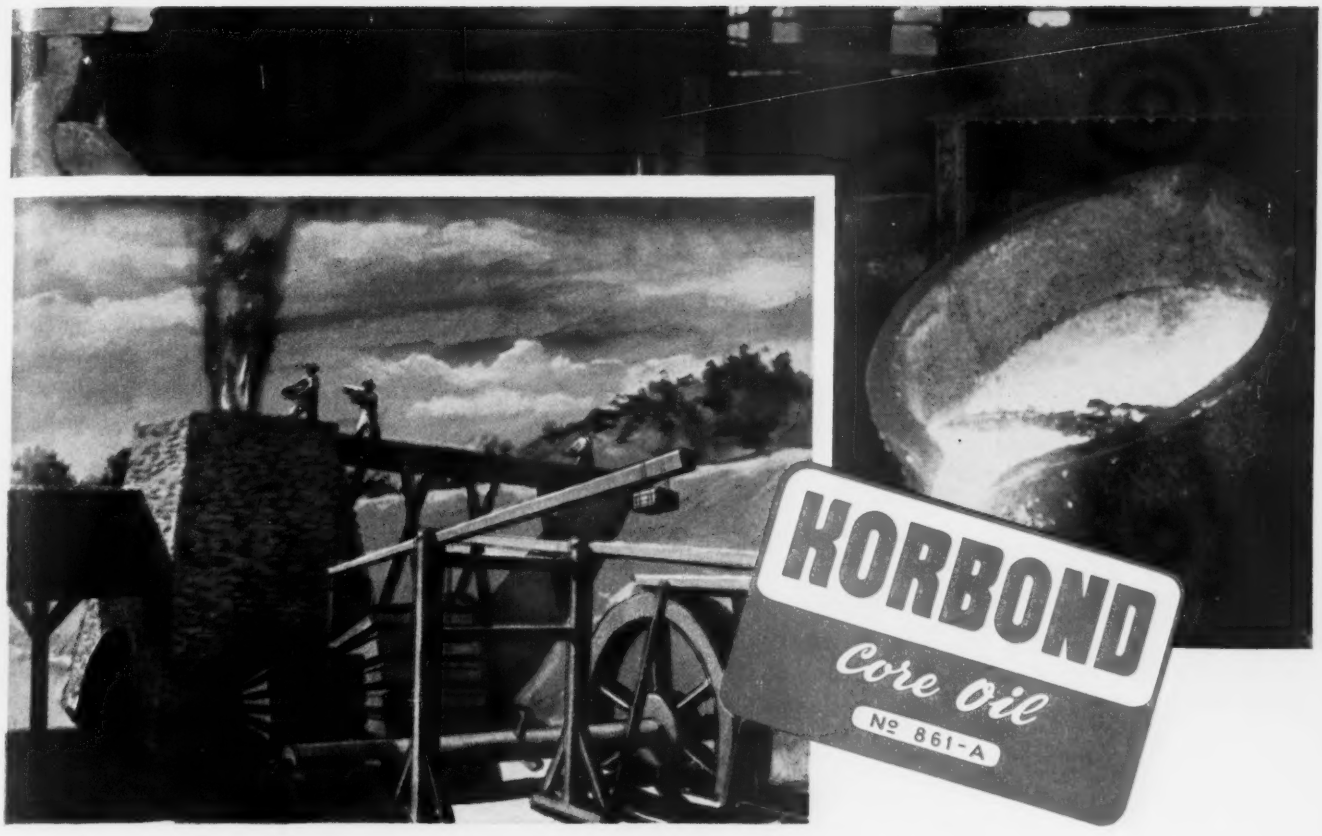
emptying sand and castings out of foundry molds or flasks while reducing manual handling. Three vibrating crane beam and hanger models are made. Load capacities vary from 1000 to 5000 lb and have spans varying from 8 to 12 ft. Units are custom built to meet customer specifications.

For More Details Circle No. 562—Page 347

## Concrete Patch

**is quick-setting and can be applied with standard tools**

Stonhard Co., 1306 Spring Garden St., Philadelphia 23, Pa.—Concrete floor repair compound requires 40 min from troweling to traffic, according to the manufacturer. Ma-




## Colonial America Is Alive Again

This time the setting is Saugus, Massachusetts where the first iron furnace ever to be operated on this side of the Atlantic has been rebuilt. It stands now just as it did in 1653 on the old foundations of the original works, a perfect replica of the plant that was pioneered by John Winthrop, Jr.

The old town was originally called Hammersmith. You could spend a charming day visiting there and reliving the days of long ago. The iron master's house, sole survivor of the original buildings, has been refurnished in the period it served. It has wide hearths, candles for lighting, and trundle beds. The furnace itself is complete with a huge water wheel to furnish power for the air blast. This air is forced through the furnace by two leather bellows flexing alternately to provide constant pressure. A separate building houses the forge plant and there a second water wheel powers the hammer. Another point of interest is the museum where parts of an original water wheel are on display together with tools, iron fittings and other artifacts salvaged from the excavations. Here too you can learn something about the restoration work which involved the moving of streets, digging for the old foundations, and endless research work in those parts of England from which the original workers and tools came.

Now the iron industry has a national shrine and those who are fortunate enough to visit there will be impressed with the generous planning of the American Iron and Steel Institute which made this restoration possible. We will be glad to mail a folder which tells of the Saugus Iron Works restoration on request.

*This is the story of two "firsts"*—the First Iron Works and United's Korbond, first in its field as a top-flight binder.

May we send you a new folder which tells the whole story of Korbond core oils. There is a real reason why they

(1) Build top strength
(2) Bake out completely
(3) Are low in gas
(4) Are clean to work with

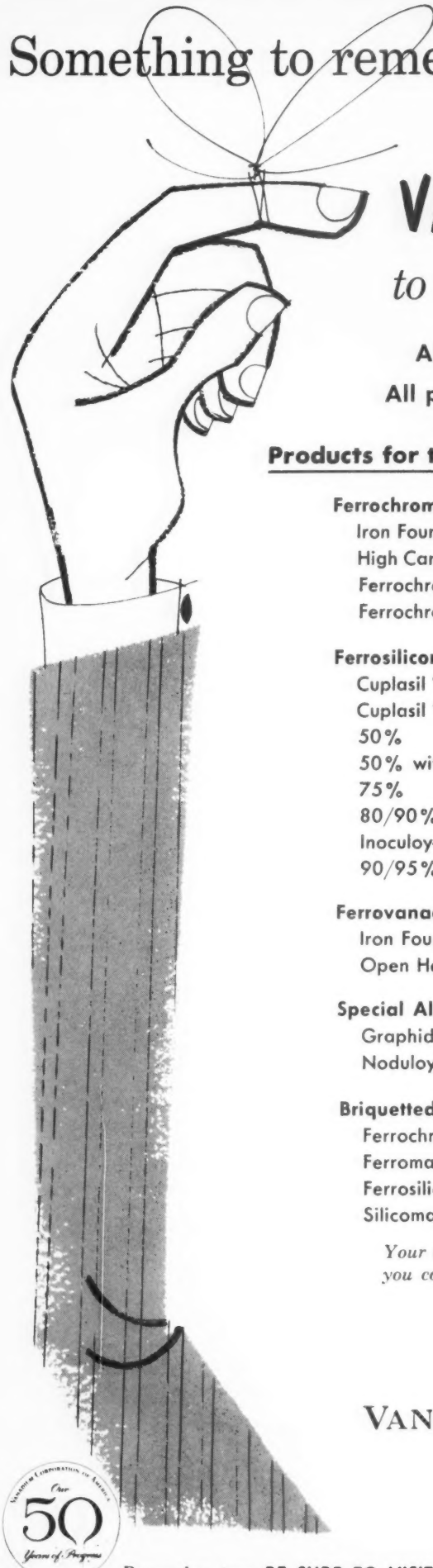
Tough problems have been solved with the right grade of Korbond, problems arising from uncontrolled ovens, high temperature pouring, and from cores that are delicately formed and baked in inset driers. These have been met and dealt with in the use of Korbond core oil. Your problem may be a different one, but we would welcome the chance to offer our service.

A card from you will bring the complete story on how Korbond has earned its place as a top-flight binder.

**UNITED OIL MFG. COMPANY**

**1429 WALNUT STREET • ERIE, PA.**

# Something to remember...



*there's a*

# VANCORAM PRODUCT

*to meet your Foundry needs!*

**All physically clean . . . all carefully graded . . .**
**All produced from the finest raw materials available!**

## Products for the Iron Foundry

**Ferrochromium**
- Iron Foundry
- High Carbon
- Ferrochrome-Silicon
- Ferrochrome "63"

**Ferrosilicon**
- Cuplasil "22"
- Cuplasil "25"
- 50%
- 50% with Boron
- 75%
- 80/90%
- Inoculoy—85/50
- 90/95%

**Ferrovanadium**
- Iron Foundry
- Open Hearth

**Special Alloys**
- Graphidox No. 4
- Noduloy Alloys

**Briquetted Alloys**
- Ferrochromium
- Ferromanganese
- Ferrosilicon
- Silicomanganese

## Products for the Steel Foundry

**Ferrochromium**
- Exlo®
- Regular Low Carbon
- High Carbon

**Ferrotitanium**
- Low Carbon
- Medium Carbon
- High Carbon

**Ferrochrome-Silicon**
- Low Carbon
- Medium Carbon

**Silicomanganese**
- 1.50% Carbon
- 2.00% Carbon
- 3.00% Carbon

**Ferrosilicon**
- Silblok "22"
- Silblok "25"
- 50% Regular and Silblok "50"
- 50% with Boron
- 65% Regular
- 75% Regular
- 80-90% Regular
- 90-95% Regular

**Ferrovanadium**

**Grainal Alloys**

*Your nearest Vanadium Corporation sales office will be happy to give you complete information on any of the Vancoram Foundry Alloys.*

VANCORAM

Producers of alloys, metals and chemicals

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Over 50 Years of Progress

*Remember, too:* **BE SURE TO VISIT VANCORAM BOOTH** VANCORAM **414-501 AFS - ATLANTIC CITY, N. J.**

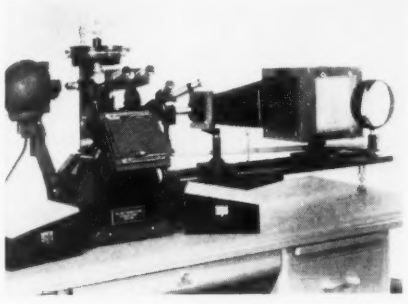
terial comes complete in container and no primer is needed. Application can be made with normal concreting tools. Material also can be used for anchoring machines and bolts to concrete bases.

For More Details Circle No. 563—Page 347

## Metallograph

**is versatile in performance of surface examinations**

William J. Hacker & Co., 82 Beaver St., New York 5, N. Y.—Research metallograph for surface examinations features conventional types of



illumination as well as low power macrophotography, microhardness testing, surface finish testing and fluorescent miscroscopy. Five alternate light sources, including a zirconium and a mercury vapor lamp, are available. All transitions are instantaneous. Viewing screen is 7 x 7 in. and two cameras for standard 4 x 5 and 5 x 7 film or plate are provided.

For More Details Circle No. 564—Page 347

## Drum Lift

**turns drum handling into an easy, one-man operation**

Sterling, Fleischman Co., Broomall, Pa.—Drum lift enables one man to handle steel drums, fibre drums and

acid carboys with minimum effort through lifting power supplied by a foot-operated hydraulic jack. Drums can be raised for pouring to a height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... the fast, neat, clean COPE and DRAG SEALER

BETTER THAN MUD OR DOUGH ROLLS!...

- **Use it right from the box . . .** convenient beads in 30″ lengths, diameters 3/16″ to 3/4″.
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- **Then forget it!** It's self-dissipating . . . leaves no residue.

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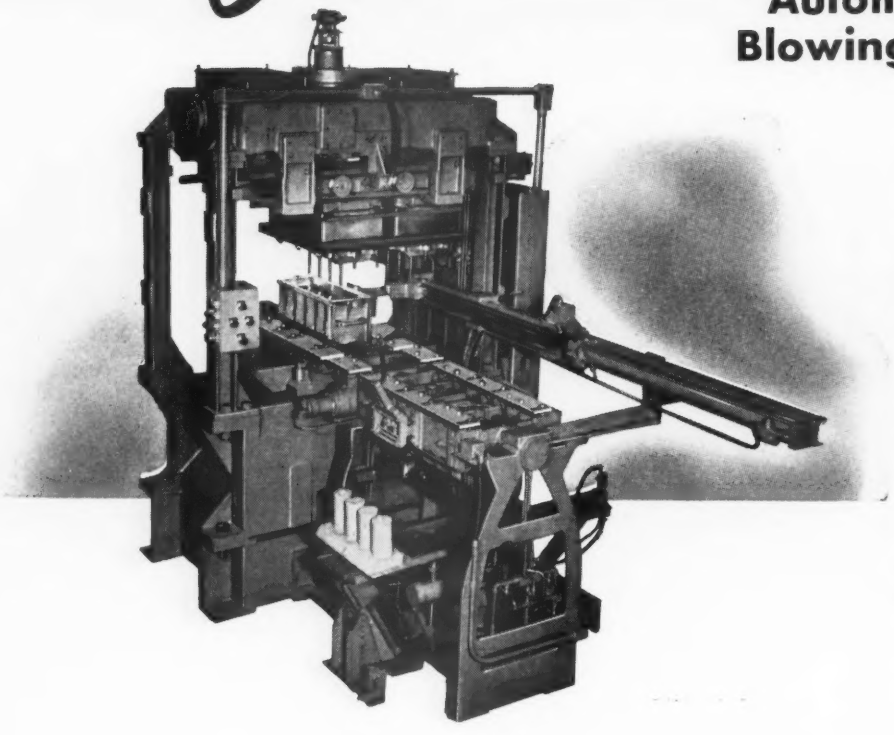
PRESSTITE ENGINEERING COMPANY
3766 Chouteau Ave. • St. Louis 10, Mo.

# YOUR *Automatic Foundry*

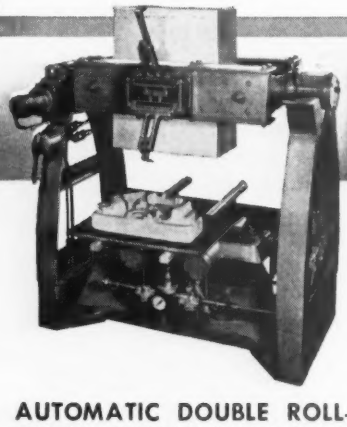
## Automatic Core Blowing Machines



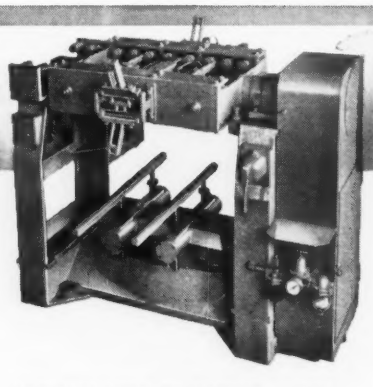
**SUTTER SP-221 "MECHANICORE" DUAL HEAD AUTOMATIC CORE BLOWER**—Automatically blows up to 250 consistently high quality cores per hour. Amazing flexibility with two refill stations . . . as one head blows, other refills. Use 2 heads to double production on same core, blow 2 different cores using 2 different sands, or use as single blower and change over fast when needed. Shown equipped with Sutter Automatic Core Box Transfer Device and Automatic Double Roll-over and Core Draw Machine with Core Pushout Device and Core Elevating Device. Maximum core box size 36″ long x 16″ wide x 8½″ deep. Maximum core weight 125 pounds. Single Head (Model SP-220) also available.

## Automatic Core Draw Machines

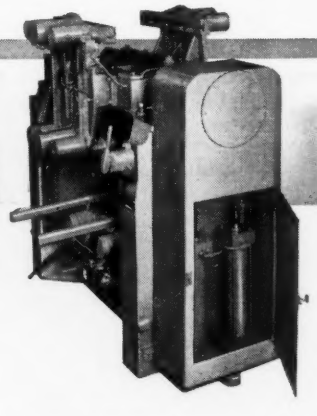
**Completely automatic cycle boosts core production from 300% to 400% and provides uniform high quality, since human element is removed from draw operation. Operator merely places core dryer. Dryer is clamped, box rolled over and core drawn automatically without any attention from operator. When unit is used with a blower, operator easily performs both blow and draw operations. Three standard models in variety of sizes.**



**AUTOMATIC DOUBLE ROLL-OVER CORE DRAW MACHINE**—Standard duty series, maximum core weight 60 pounds. Automatic core pushout device and elevator mechanism also available for this and all other Sutter Core Draw Machines. Minimum cycle, 6 seconds.



**AUTOMATIC DOUBLE ROLL-OVER CORE DRAW MACHINE** for heavy duty operation. Minimum operating cycle, 6 seconds. Maximum core box size, 9¼″ deep x 20″ wide x 30″ long. Maximum core weight, 150 pounds. Available in three standard sizes.

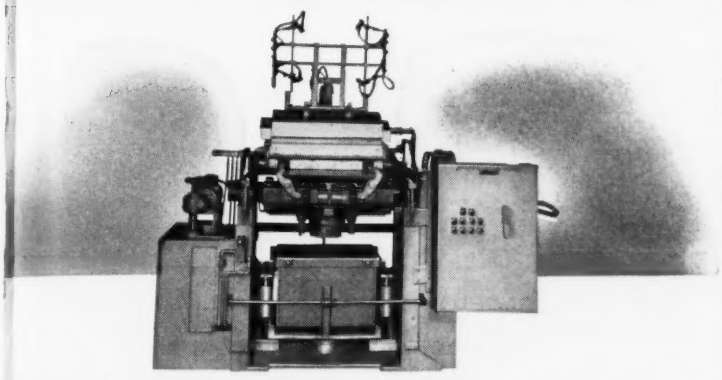


**AUTOMATIC DOUBLE ROLL-OVER CORE DRAW MACHINE** with side drawbacks. SP-540 Series. Minimum cycle, 20 seconds. Maximum core box size, 26″ long x 13″ wide x 10″ deep. Ideal for both high production and jobbing work. Maximum output—minimum operator fatigue.

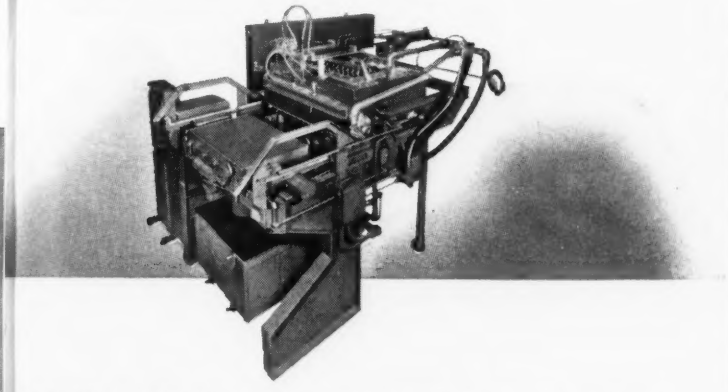
***See These Sutter Products at the A.F.S. Foundry Exhibit, Atlantic City, N.J.—BOOTH NO. 1336-38***

# IS CLOSER THAN YOU THINK!

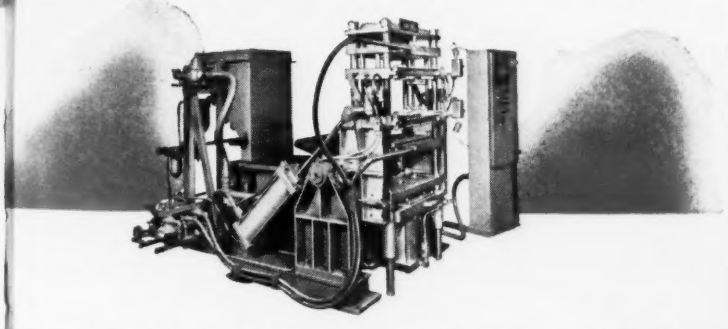
## Automatic Shell Core and Shell Mold Blowing Machines



**SUTTER MODEL SP-1000**—Produces fully-cured, smooth, precision shell molds. Adjustable coating and curing times. Oven and pattern temperatures thermostatically controlled. Completely automatic cycle assures quality control, even with unskilled operator. On short runs, entire pattern area can be used for various patterns by using Sutter Quick Change Mask. Maximum mold size, 20" x 30" x 6" high.



**SUTTER MODEL SP-1100**—Automatic production of precision, high-quality shell molds at 40-50 cycles per hour. Adjustable coating and curing times. Oven and pattern temperatures thermostatically controlled. Pattern plates have integral stripper pins for lower pattern costs, faster pattern changeover and, for short runs, entire pattern area can be utilized with Sutter Quick Change Mask. Maximum mold size, 26" x 41" x 12" high.



**SUTTER MODEL SP-1300**—Automatic Shell Core and Shell Mold Blower. Blows and fully cures solid or hollow precision cores at 50 to 90 cycles per hour. Shell molds produced on this machine are as accurate on the outside as the inside. Maximum box size, 14" x 24" x 10"; maximum draw, 5"; maximum core or mold weight, 16 pounds. (Larger Model SP-1400 has box size 20" x 38" x 10".)

★ **CUT COSTS**

★ **IMPROVE QUALITY**

★ **INCREASE PRODUCTION**

### with this Sutter "Advanced Design" Automatic Foundry Equipment!

Whether your foundry is large or small, your production runs long or short . . . Sutter equipment will bring you the benefits of modern automatic core and mold production for a surprisingly modest investment.

Sutter Core Blowing, Core Drawing and Shell Molding Machines are engineered and manufactured by an organization devoted exclusively to solving processing problems for production and jobbing foundries. Since work cycles on these machines are fully automatic, unskilled operators turn out the highest production with consistent top quality. The equipment is versatile, designed to be switched quickly from one job to another as needed. Maximum safety and minimum operator fatigue are features of every unit. All electric and pneumatic controls and equipment meet both J.I.C. standards and the latest national safety codes. Every Sutter machine is backed by years of experience in the foundry field, is practically engineered, built by skilled craftsmen from the finest materials, and thoroughly tested and inspected.

Sutter foundry equipment is proving its worth daily in foundries the world over, and has done so during years of satisfactory, efficient operation. Take steps now to make your foundry an "automatic foundry". The installation of low-cost Sutter equipment is a major step toward the economy of complete automation. Write today for full information.

**SUTTER**

**PRODUCTS CO.**

*Also designers and manufacturers of special equipment.*

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***Top Quality***
**Castings**
**with**
***Top Quality***
**FOUNDRY MATERIALS**

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Century Molding
*Ottawa Blackhawk Silica
Muskegon Lake Sand
Tenn. & Ind. Molding
Utica Crude Silica
Green Lake Shell
*Zircon Sand, Flour and Wash
Berlin Core Sand
Red Flint Annealing
New Jersey Molding
Gallia Red Molding
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*Volclay, MX-80 (Granular)
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Mallan' Steel Shot and Grit
*Malleabrasive Shot and Grit
*Certified Shot and Grit
*Blackhawk Sand Blast Sand
*Super-Titan Nozzles

**REFRACTORIES & MISC.**
Cargan Cupola Gun Mix
Firegan Ganister
*Microsil Silica Flour
Fluxing Limestone
*Five Star Wood Flour
*Sultron Foundry Flux
Fluorspar—Lump & Gravel

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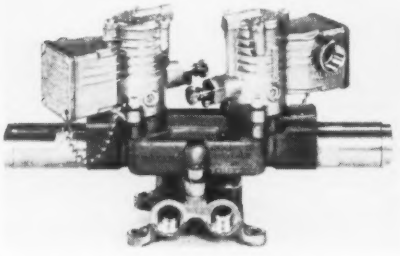
of 53 in. Center of gravity of the drum is always maintained within four casters to prevent lift from turning over. Girdle device grips the drum firmly and permits 360-degree drum rotation. Brakes on the drum-lift arm hold the drum at any angle.
For More Details Circle No. 565—Page 347

## Valve Attachment
**provides full control of double-acting cylinders**

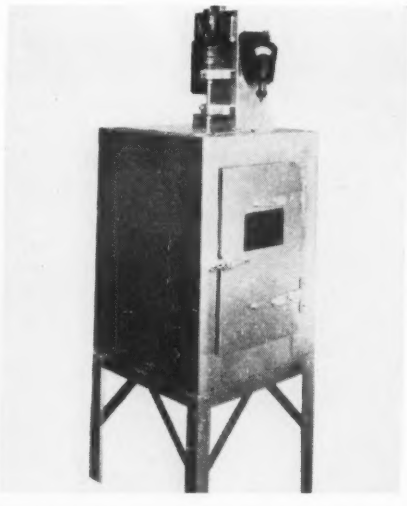
Valvair Corp., 454 Morgan Ave., Akron 11, O.—Power-centered neutral attachment for double solenoid valves provides full control of double-



acting cylinders and similar devices. Attachment consists of stop plungers in extensions mounted at end of the valve body and uses air power to provide mechanical centering of main valve stem in neutral position. Attachment may be installed in double solenoid valves now in service as well as on new valves.
For More Details Circle No. 566—Page 347

## Box Ovens
**are of forced air circulating type with positive exhaust**

Drying Systems Inc., 1800 Foster Ave., Chicago 40, Ill.—Electrically heated box ovens for small and me-



dium-sized requirements are of forced-air circulating type with positive exhaust. Temperatures up to 500° F are obtainable. Inside space

***NOW*** **users of SAND TRANSMISSION PIPELINES Cut Replacement Time *with* Non-Welded Installations of WELD+ENDS with Clamping Screws**

•

Replacing sand transmission piping lines is quicker, easier with non-welded installations of WELD + ENDS with clamping screws. No threading, no special make-ready is necessary. Cut the pipe—slip the WELD+ENDS on—tighten the clamping screws . . . That's all there is to it.

Non-welded WELD + ENDS are better than flanges, especially where there is frequent replacing of pipe. They can be used over and over again with only the clamping screws requiring replacement.

Where pipeline vibration is severe, clamping screws may be equipped with Nylok lock nuts and Shakeproof washers as shown in the illustration.

Reusable non-welded installations of WELD + ENDS offer continuous savings in down time and repair costs. Write today for further information—also inquire about Plidcowear erosion-resistant pipe. Address Dept. E2

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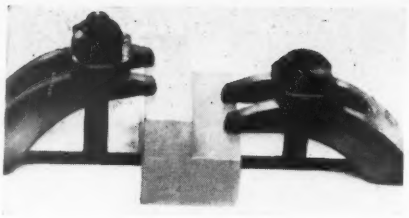
*Smelters and Refiners of Brass and Aluminum Alloys*

varies from 18 x 18 x 18 in. to 48 in. wide x 60 in. deep x 60 in. high. Small ovens are elevated on stands. Large ovens set on floor. All are insulated, and hinged doors are equipped with pressure release locks.
For More Details Circle No. 567—Page 347



## Hold-Down Clamps

**eliminate shims and need for vises on many jobs**

Bausch Products, 18411 West McNichols, Detroit 19, Mich.—Hold-down clamps reportedly are fast and simple to operate and eliminate vises on many jobs. Narrow grooves, ledges or corners provide sufficient space for effective clamping. One prong in position is said to be strong enough to hold work piece firmly. Concave washers supplied with each clamp distribute pressure evenly and locate pressure tangent point automatically. Clamps are heavy-duty steel to withstand required holding pressures.
For More Details Circle No. 568—Page 347

## Portable Belt Unit

**is adaptable to many diverse parts handling applications**

Standard Conveyor Co., 315 Second St. N.W., North St. Paul 9, Minn.—Portable conveyor belt for parts handling is made in 4, 6 or 18-ft lengths with belts of 8, 12 or 16-in. widths of three-ply, 16-oz oil-resistant rubber having 1½-in.-high molded cleats at 24-in. centers. It is also available as three-ply, 32-oz stitched canvas belt with 1¼-in. steel angle cleats on 24-in. centers. Heavy-duty metal belts can be supplied for hot operations. Unit can be set level 18 to 31 in. or at slopes to 60 degrees.
For More Details Circle No. 569—Page 347

## Belt Grinders

**feature rubber contact wheels and improved belt alignment**

Delta Power Tool Division, Rockwell Mfg. Co., 446 North Lexington Ave., Pittsburgh 8, Pa.—Belt grinders feature rubber contact wheels and improved belt alignment adjustment. Contact wheels enable user to get a better finish in less time while

15 circular magnets by EC&M . . . a size for every need. Write for Bulletin 900-F, describing them.

WITH EC&M LIFTING MAGNETS

A clean sweep of the car bottom gets the entire useable pay load. And for insuring FULL LOADS per lift, there's nothing to equal EC&M ALL-WELDED Lifting Magnets. Welded construction keeps pole shoes tight . . . maintains magnetic path at highest efficiency. Welding also eliminates recesses for pole shoe bolts and gives better proportion for coil space. It takes PULL for handling scrap, pig iron, hot castings . . . and EC&M Magnets have it.

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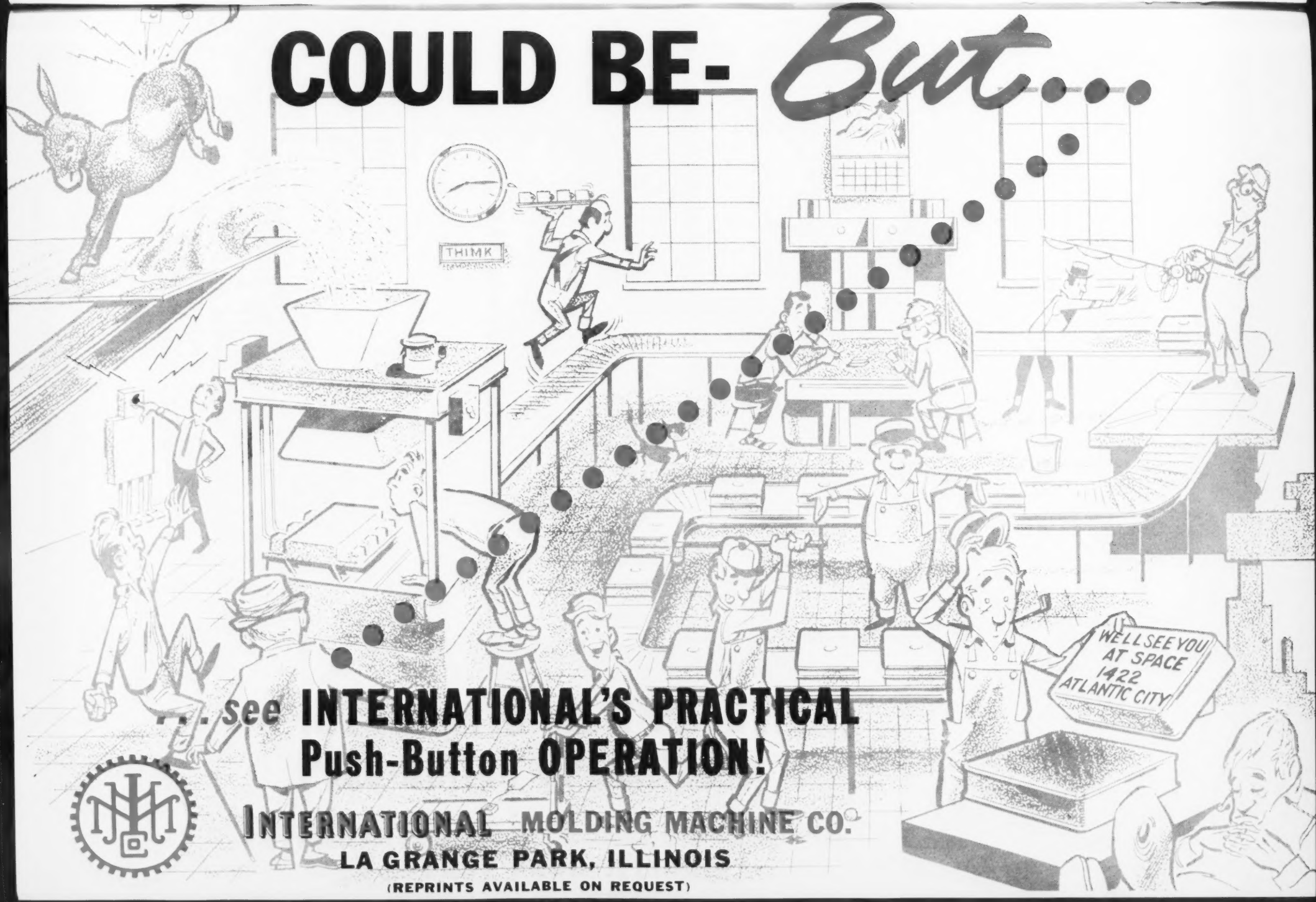
COULD BE- But...
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WELL SEE YOU AT SPACE 1422 ATLANTIC CITY
...see INTERNATIONAL'S PRACTICAL Push-Button OPERATION!
INTERNATIONAL MOLDING MACHINE CO.
LA GRANGE PARK, ILLINOIS
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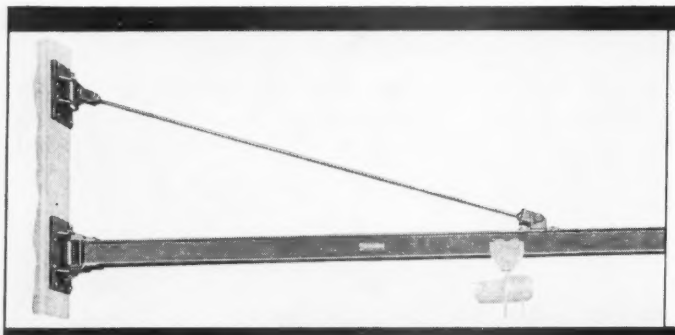
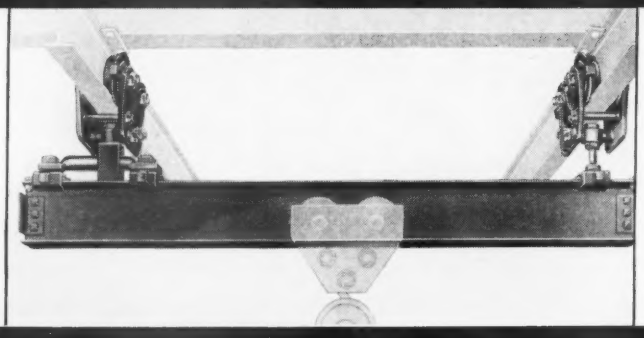
# The solution to your foundry problems often hang on ONE of R-W's BIG 3



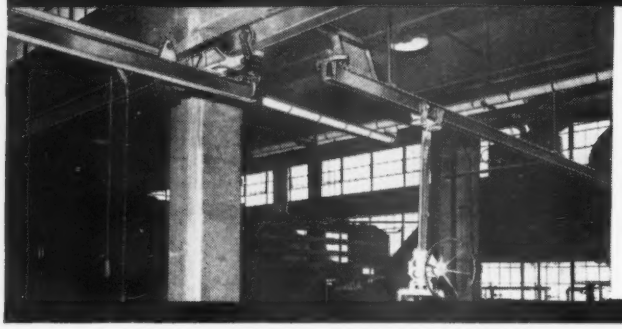
**R-W 939**
**Swinging Jib Crane**

. . . is most commonly used with the rod support (above), but is also available with curved track for supporting outer end of boom. Available in a wide variety of sizes with capacities up to 4000-lbs.



**R-W 971**
**Flexible Traveling Crane**

. . . yoke and cross head are self-adjusting to variations in track span . . . crane cannot bind because bridge need not maintain right angles to tracks. Available in many sizes with capacities up to 8000-lbs.



**R-W 3900 Series Tru-Tred**
**Crane and Monorail**

. . . combines ladle handling with maximum smoothness and safety, plus 100% utilization of pouring floor area. Transfer crane with safety interlocks at transfer points provides utmost flexibility and easy handling throughout pouring operations.

## . . . quality engineered for precise performance!

Today's featured performers in many modern foundries, are Richards-Wilcox cranes and Monorail conveyors. That's because these material handling systems are scientifically engineered to cut costs, break bottlenecks, speed production—while operating with safety and efficiency at low cost.

Your problem—whether it involves a single unit for a particular handling step, or a complete system for your overall operation—can often be solved *best*, with economical Richards-Wilcox equipment.

**See R-W Equipment Displayed at Booth 402 · Materials Handling Show · Cleveland Auditorium, June 6-8**

*Why not lay your foundry material handling problems before a Richards-Wilcox engineer today. He can show you, without cost or obligation, how to effect remarkable savings in time, money and maintenance.*

**Richards-Wilcox**
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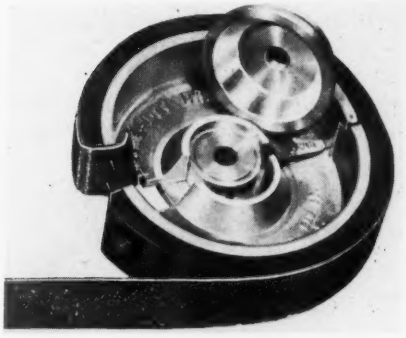
increasing life of belts. Hubs are designed to accommodate tires 2½ in. wide x 6 in. in diam. Back stand idler units are designed to make possible lateral adjustment of the drum.

For More Details Circle No. 570—Page 347

## Drum Sander

**has a split-drum wheel and uses ordinary abrasive strips**

American Diamond Saw Sales, 120 North West Ninth Ave., Portland 9, Oreg.—Drum sanders are cushioned with neoprene rubber which is resistant to oils, grease, kerosene and other petroleum products frequently used in connection with buffing, grinding or polishing operations. Sanders now can be run in these liquids without swelling or softening the rubber cushioning. Sander has a split-drum wheel that makes possible the use of strips of abrasive torn off abrasive rolls.



For More Details Circle No. 571—Page 347

## Aluminum Alloy

**for automotive pistons has a reduced nickel content**

Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.—Aluminum casting alloy reportedly is unaffected by nickel shortages and has been developed to replace company's older automotive piston alloy which has a higher nickel content. New alloy has a 0.5 per cent nickel maximum, Cu 2.0-4.0, Fe 1.2 max, Si 8.5-10.5, Mn 0.5 max, Mg 0.5-1.5, Zn 1.0 max, Ti 0.2 max. Others, total 0.5 max.

For More Details Circle No. 572—Page 347

## Cream Soap

**does not run off hands and discourages wasteful usage**

Sugar Beet Products Co., 320 Waller St., Saginaw, Mich.—White, opaque, thick-bodied cream soap reportedly does not run off the hands when dispensed and can be used in both washroom and shower. Soap is dispensed from a "throw-away" container containing a manually operat-

SPECIFY SALL METALLURGICALLY CONTROLLED COPPER-BASE ALLOYS

We're producing what we believe to be the finest brass and bronze ingot metal available today. As defined by the Brass and Bronze Ingot Institute, "Quality Ingot" signifies and denotes ingots processed under continuous technical control to meet chemical and physical specifications.

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FREE FOLDER
It explains reasons behind Sall's "Quality Control"

"Better Alloys for Better Castings Through Creative Metallurgy"

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PRODUCERS OF: *Aluminum, Brass and Bronze and Zinc Alloy Ingot; Hardeners, Z-shot and bar for Zamak production; Salloy; Special Alloys*

ed meter that emits the correct amount for a hand wash and discourages wasteful usage.

For More Details Circle No. 573—Page 347

## Belt Grease

**serves as a polishing aid for abrasive belt operations**

Kocour Co., 4800 South St. Louis Ave., Chicago 32, Ill.—Belt grease is a polishing aid for abrasive belt operation on both ferrous and nonferrous metals. Its nonloading properties maintain a film on the abrasive surface, thus preventing metal particles which normally adhere to cutting points from loading up the abrasive surface. Grease is supplied in paper tubes weighing about 1¼ lb.

For More Details Circle No. 574—Page 347

## Slip Ring Motors

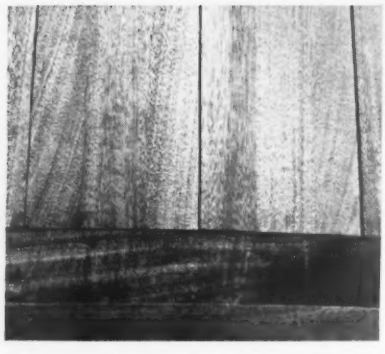
**have variable speed and step-by-step starting features**

Reuland Electric Co., Alhambra, Calif.—Variable speed and step-by-step starting features of slip ring motors are available in standard units in ratings of ¼, ⅓, ½ and ¾-hp. Motors have application on conveyors, ventilating equipment, cranes and hoists and other machines that require operator-regulated running speeds. Motors are available with speed selections from 50 to 100 per cent of full load speeds in the following ratings: 1800 rpm, ¼, ⅓, ½, ¾, 1 and 1½ hp; 1200 rpm, ¼, ⅓, ½, ¾ and 1 hp.

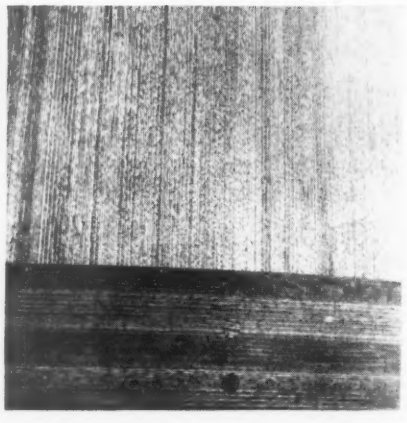
For More Details Circle No. 575—Page 347


# *Insure DIMENSIONAL STABILITY in Models and Experimental Shell Molds with*

# Stabilite



Swelling and movement of wood render this model, made of conventional mahogany, unusable as a die model.



This die model made of STABILITE retains its smooth, even finish and dimensions necessary for an accurate die, or pattern for stampings and castings.

STABILITE is a new dimensionally stable mahogany carving wood, especially made for die models and experimental shell mold patterns. It offers many advantages, including:

- Extreme stability; resists swelling and shrinking
- Readily carvable; can be glued under usual shop conditions
- Resistance to heat, acids, fungi, insects and decay
- Usable as a master pattern to take as many casts as desired
- Virtually eliminates re-work time, cutting labor costs

***Complete STABILITE models will be on display at A. F. S. Convention, May 3-9 at the STABILITE Booth #113***

Manufactured by
**Nickey Brothers, Inc.**
**Memphis, Tennessee**

Distributed by
**Aetna Plywood & Veneer Co.**
**1714 N. Elston Avenue, Chicago 22, Ill.**

Aetna Plywood & Veneer Co., Engineering Sales Div.
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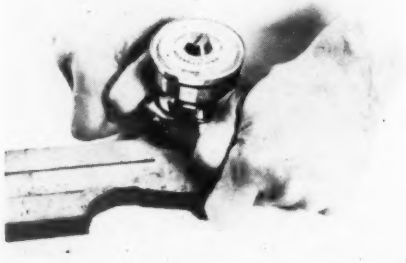
Please send us special descriptive folder on *Stabilite*—the only wood that "stays put".

Name .....
Company name .....
Street Address .....
City .....Zone.....State.....


## Portable Hardness Tester

**provides direct readings equal to Rockwell or brinell scales**

Newage International Inc., 222 York Rd., Jenkintown, Pa.—Portable metal hardness tester provides direct readings corresponding to Rockwell



A, B or C scales or brinell medium or low scales. A direct reading is taken by placing the tester on the metal and pressing hand grips down. Unit has no base plate or pressure screw clamp attachments. No need for conversion charts or calculations. Each instrument is individually calibrated to ±1.5 points Rockwell and 5 points brinell. For continuous-run testing a bench adapter is available from which the unit can be moved for use elsewhere.

For More Details Circle No. 576—Page 347

## Air Line Filters

**have automatic drain units for ¾ and 1 in. air lines**

C. A. Norgren Co., Englewood, Colo.—Filters with automatic draining facilities are available to plants with ¾ and 1 in. compressed air lines. Three types of filter elements are supplied—standard 200 mesh wire screen (74 micron) and two optional 64 and 25 micron sintered bronze elements.

For More Details Circle No. 577—Page 347

## Perspective Drawing

**method provides accurate, simple, fast representations**

Perspective Inc., 402 American Bldg., Seattle 4, Wash.—System of perspective drawing reportedly gives

"LOOK FOR US THERE, TOO! AT BOOTH 1939"

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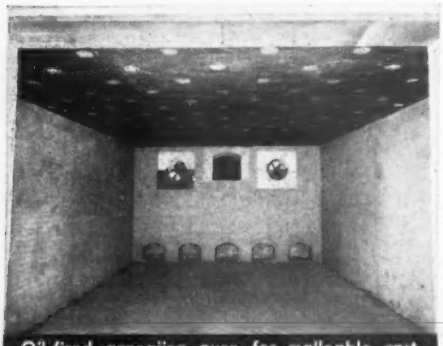
# IMPROVED annealing cycles

*through*

## A. P. GREEN *Engineered*

## REFRACTORY LININGS



Oil-fired annealing oven for malleable castings. The flat suspended arch is KAST-O-LITE and the sidewalls are G-23 Insulating Firebrick.

Malleable operators report easier controlled annealing cycles through the use of the proper combination of A. P. Green refractories. Efficient furnace operation means lower production costs and better control of the physical properties of the castings. It can only be achieved by a refractory enclosure which contributes to the desired annealing cycle.

A. P. Green KAST-O-LITE insulating refractory castable was used throughout sidewalls and arch for this pulverized coal-fired oven.

The two ovens illustrated are typical examples of A. P. Green engineered refractory linings. One is a complete monolithic lining of A. P. Green KAST-O-LITE, a light weight castable refractory. The other is a combination lining—KAST-O-LITE arch and G-23 Insulating Firebrick sidewalls. Both have excellent performance records effecting improved product quality at reduced fuel costs.

The A. P. Green Fire Brick Company Engineering Department will assist you with further information on the application of these materials to new units or the conversion of existing furnaces. Call your local A. P. Green distributor . . . he's listed in the yellow pages of your telephone directory . . . or write . . .

A. P. Green REFRACTORY PRODUCTS

**A. P. GREEN FIRE BRICK COMPANY**
**MEXICO, MISSOURI, U. S. A.**
**PLANTS:** Mexico, Mo. • Woodbridge, N. J. • Sulphur Springs, Texas

*In Canada:*
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At the
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photographic accuracy, yet is simple and fast in the representation of a subject on a plane surface. Basic sets of seven grids in three different sizes for interior and exterior rendering are available. Grids in any size are displaced progressively from each other in steps of 20 degrees. Rotation of a basic set makes possible a total of 81 different positions in the representation of a subject.

For More Details Circle No. 578—Page 347

## Power Buggy

**is able to turn around within a radius of its own length**

Creative Metals Corp., 1290 Powell St., Emeryville, Calif.—Power buggy for material handling use can turn

around within a radius of its own length, has a heaped capacity of 13½ cu ft and a maximum travel speed of 17 mph when empty. Unit is climb-load rated at 1450 lb on a 35 per cent grade and 2250 lb on a 25 per cent grade, plus ability to stop with load, pick up material and resume climb.

For More Details Circle No. 579—Page 347

## Induction Heating

**equipment line is expanded to give full range of sizes**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.—Company has expanded its line of induction heating equipment to include 960, 3000 and 10,000 cycle low frequency, motor-generator units. Available in sizes from 30 to 1250 kw, units are suited to brazing, case hardening, heating for forging and melting applications.

For More Details Circle No. 580—Page 347

## Solenoid Valve

**provides electrical control to heavy hydraulic machinery**

Magnatrol Valve Corp., Hawthorne, N. J.—Packless solenoid valve designed for use with soluble oil, hydraulic oil or water at fluid temperatures up to 212° F is being applied successfully, according to the manufacturer, to the electrical control of


**Quantometer Analyses Service at Surprisingly Low Cost . . . for**

- CAST IRON
- DUCTILE IRON
- BRASS and BRONZE
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- ALUMINUM
- TITANIUM METAL
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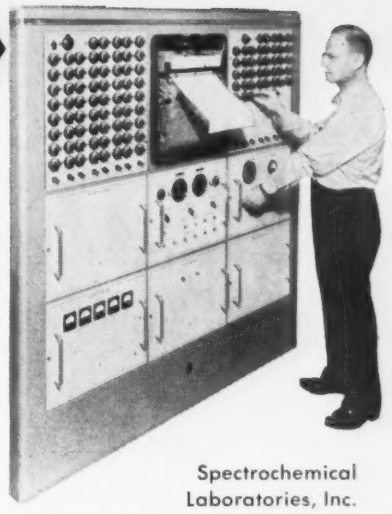

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**Molten lead over 700° was poured on a stock Dandux Insulex STITCHED CANVAS BELT. When the lead hardened and was removed, there was absolutely no sign of scorching or damage to the belt.**

- ***INSULEX*** . . Has a layer of special insulating compound between the asbestos surface and the body of the belt.
- ***DOUBLE INSULEX*** . . Two layers of insulating compound between asbestos and belt make this belt unequalled for handling extremely hot material.
- ***PYROFLEX*** . . . Belting is ideal for conveyors and elevators handling hot materials up to 300°.

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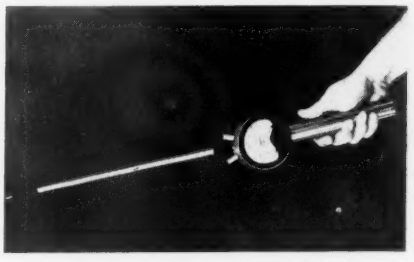
heavy hydraulic machinery. Valve can be fitted with a dashpot for the independent regulation of opening and closing speeds. Vent screw adjustments are external, independent and can be made with the system under pressure. Valves have a working range of 300 psi maximum.

For More Details Circle No. 581—Page 347

## Probe Pyrometer

**is portable but is built to withstand extreme service**

Pacific Transducer Corp., 11836 West Pico Blvd., Los Angeles 64, Calif.—Hand-held probe pyrometer



can be used in all types of noncorrosive metallic and nonmetallic liquids and in atmospheres of furnaces, kilns, ovens and other high heat containers. Probe is 19 in. long. A chromel-alumel couple has a range of 2300° F and an iron constantan couple has a range to 1600° F. Movement has a 2 2/3-in. length of scale and an adjustment screw for cold-junction temperature.

For More Details Circle No. 582—Page 347

## Flooring Compound

**can be applied without roughening or chipping old surface**

Monroe Co., 10703 Quebec Ave., Cleveland 6, O.—Flooring compound is formulated with granular plastic resins and nonstone aggregates to produce a hard, smooth, resilient floor that will handle 20 ton loads. Material can be used to patch or resurface any concrete, indoors or out. It can be applied without chipping or roughing the old surface and is claimed to be ready for use within 4 to 6 hours after installation.

For More Details Circle No. 583—Page 347

## Fans

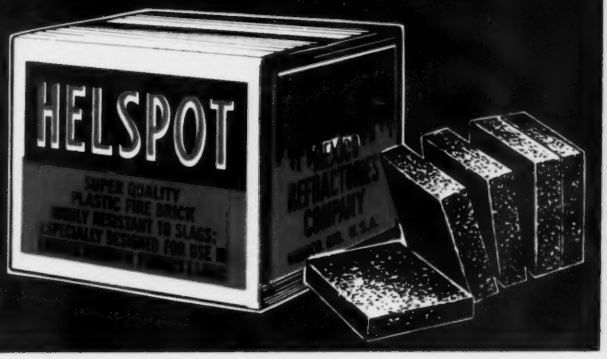
**have static pressure ratings from 5 through 11½ in.**

Trane Co., La Crosse, Wis.—Fans for high velocity air conditioning systems or industrial use have air capacity ratings ranging in static pressure from 5 through 11½ in., in ½ in. increments, with a total high pressure limit at 12¼ in.

For More Details Circle No. 584—Page 347

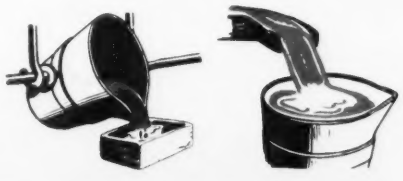
# HELSPOT

## PLASTIC
### For Repairs



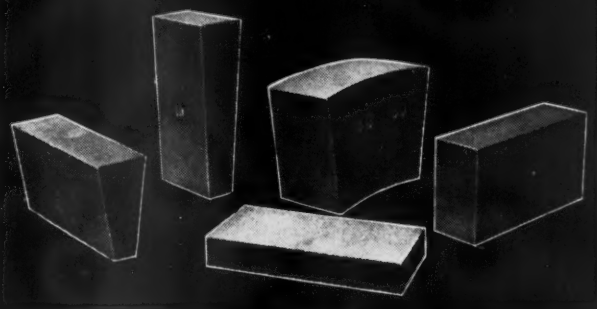

For fast, safe and economical repairing of the fire clay lining in the cupola-well, HELSPOT plastic may be easily installed over the spalled and eroded surface; simply ram HELSPOT in the "dished-out" area. It is easy to handle and install. Its "lubricating" qualities minimize the formation of slag and promote free flowing of the metal. Test HELSPOT by using it on your next repair job . . . let it prove its performance.

HELSPOT plastic is packed in 100-lb. waterproof cartons. It is conveniently sliced for ease of handling.



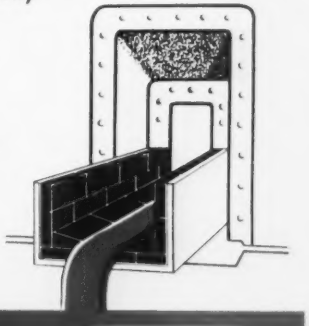
For quick repairs of ladle-linings, runners and spouts, rely on HELSPOT plastic.

## BRICK
### For Linings



HELSPOT brick, with a graphite base and high refractoriness are ideal for lining the cupola-well below the tuyeres. In many installations they are credited with giving many times the life obtained from brick and clay combinations. Maintenance problems are reduced, doors drop more freely; a marked saving in labor drudgery is noted. Production is increased, operation is more economical and purity of metal is increased.

HELSPOT BRICK are available in standard 9-inch series shapes and 9x6x4 cupola block sizes.



Warehouse stocks and distributors in principal industrial areas. See the classified section of your telephone directory for the distributor nearest you.

You are invited to meet
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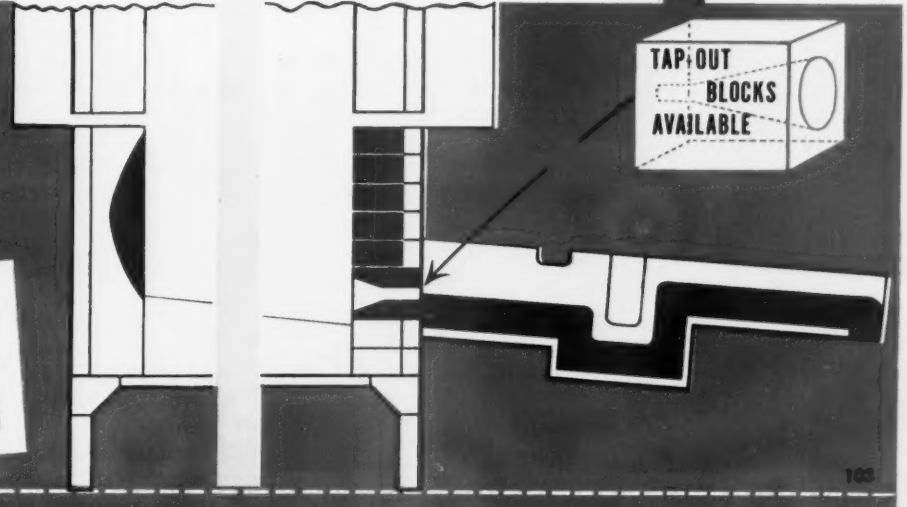
in Booth 1313 at the
A. F. S. Convention in Atlantic City
**May 3 thru May 9**




103

**MEXICO REFRACTORIES COMPANY**
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*Canadian Affiliate:* REFRACTORIES ENGINEERING & SUPPLIES, LTD., Hamilton, Ontario, Canada

# The Shakeout

## Rope Withstands Temperature of 2300° F

FIBERFRAX CERAMIC FIBER, a product of Carborundum Co., Niagara Falls, N. Y., now is available in rope form. An aluminum-silicate material, it takes heat as high as 2300° F. In the view shown here, it is withstanding the heat of a blowtorch and the pull of a weight without any perceptible damage.

Thirty feet of the rope ½-in. in diam weighs 1 lb. It is highly resilient and is reported to be especially useful as expansion joint packing and high-temperature calking. It also can be used as insulator wrapping and for various high-temperature gaskets and seals. Like the other forms of the material, the rope is chemically inert.

For More Details Circle No. 596—Page 347

## Self-dumping Hoppers Handle Bulk Material

RATHER THAN HANDLE bulk materials of varying sizes and weights with two or three different techniques, Henning Brothers & Smith, Brooklyn, N. Y., smelters and refiners of nonferrous metals, have gained in efficiency and saved money by standardizing on a single method—the use of large-capacity, self-dumping hoppers. Nine Roura hoppers, each of 2½-yd capacity, are stationed around the plant for various purposes.

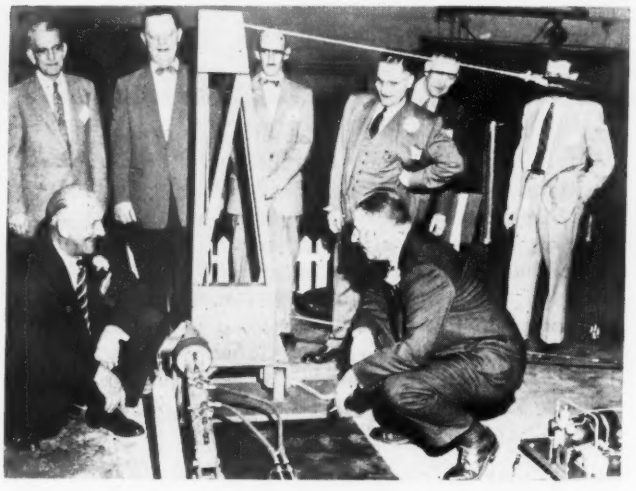
As shown in the accompanying illustration, aluminum scrap is sorted by grade into several hoppers. Full hoppers are removed by lift truck and dumped into melting furnaces. In another use, rough ingots of zinc dross from the smelter are dropped into a hopper at 400-600° F, and a fork truck moves the hopper to an outside storage area. In a third application, brass ingots at 200-300° F are carried by conveyor belt from the casting furnace to a hopper which is moved to a storage area by fork truck. The hoppers reportedly require no maintenance.

For More Details Circle No. 597—Page 347

## Over-run Barrier Stops Jet Aircraft

THIS FULL-SIZED WORKING MODEL of the aircraft over-run barrier made by Acme Aluminum Alloys Inc., Dayton, was on display at the company's recent open house. Made by Acme for Air Force and commercial use, it is employed to stop jet fighter-type aircraft in danger of overshooting a runway for any reason.

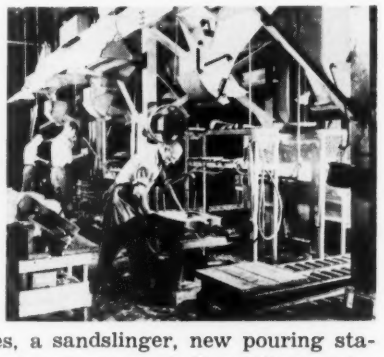
Shown here is the actuating mechanism, which lies flat on the runway until actuated by the control tower operator when a pilot requests it. On the left is Karl Stein, chairman of Acme's board of directors and founder of the company 35 years ago. President R. C. Crouch is on the right. Formerly an aluminum foundry, Acme now does manufacturing, tool and die and pattern work.



For More Details Circle No. 598—Page 347

## Steel Foundry Completes Modernization

A YEAR OF MODERNIZATION at the Buffalo plant of Allegheny Ludlum Steel Corp., Pittsburgh, has just been completed. The plant produces stainless steel and other high-alloy castings. Among the new equipment is the complete overhead sand handling system shown here, which serves the molding machines. Sand is delivered in the overhead hoppers, and the operators release enough sand for their molds with the flick of a handle.

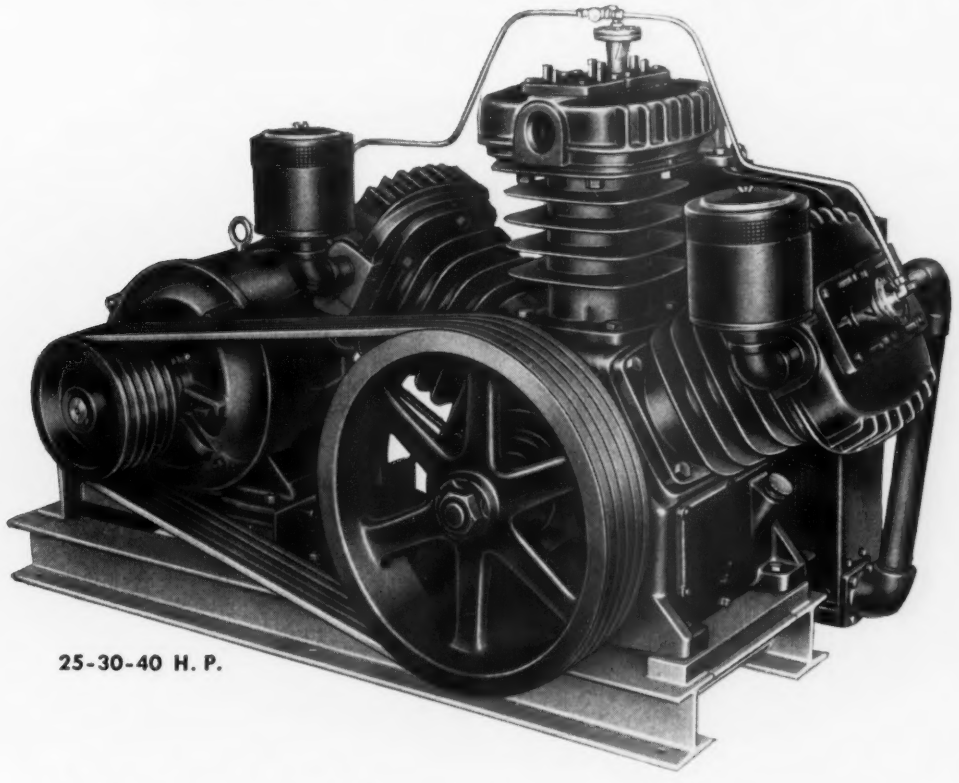


Other new equipment includes two 1-ton induction furnaces, a coreblower, three molding machines, a sandslinger, new pouring stations, a large heat treating furnace, shell molding equipment and pickling facilities. New testing equipment also was added, to help insure products of uniform quality.

For More Details Circle No. 599—Page 347

THE NEW CURTIS MODEL C-100
TWO-STAGE, AIR-COOLED AIR COMPRESSOR

# Provides Higher Operating Efficiency
# Costs Less to Install



25-30-40 H. P.

**THIS NEW** Curtis Two-Stage will deliver more air per minute, per horsepower and per kilowatt hour of electrical energy consumed, thus assuring a saving in your electrical bill.

It's Air Cooled, thereby eliminating expensive water bills and assuring quick and easy installation with no complicated plumbing problems.

The new C-100 embodies all the well-known Curtis engineering features such as centro-ring oiling and Timken Main Bearings.

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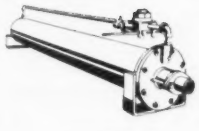
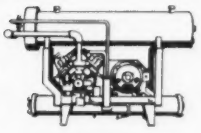
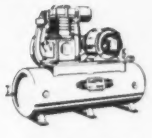


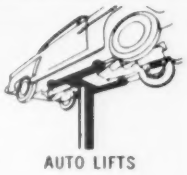
AIR HOISTS
AIR CYLINDERS



PACKAGED LIQUID
CHILLERS



AUTOMOTIVE
AIR COMPRESSORS



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AIR
CONDITIONING

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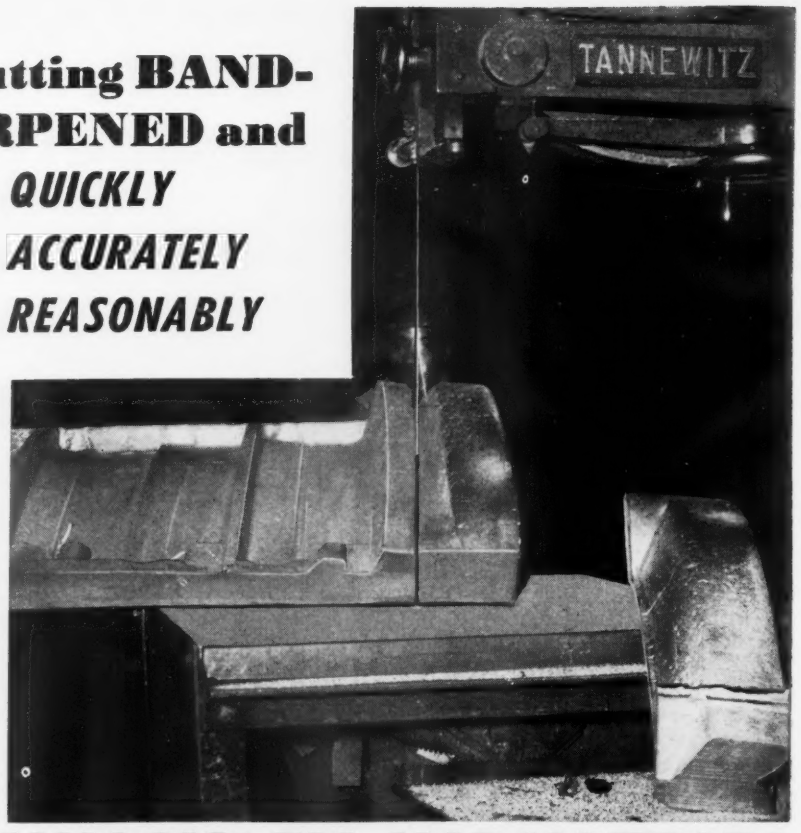
The Lenox blade you see here in a Tannewitz machine is one of our responsibilities. We keep it sharpened and repaired for the Harsch Bronze and Aluminum Foundry, Cleveland, where it gets plenty of hard service. Photo shows it sawing a large riser from a heavy aluminum casting. Jobs like these are rough on bandsaw blades—and that's why our services are so helpful. We keep these blades sharp; we adjust the teeth, check the pitch, and keep life in blades that otherwise are headed for the scrap pile. If you use metalcutting bandsaws, we can save you money by taking care of your blades. Just ask us; we'll show you. Write today:

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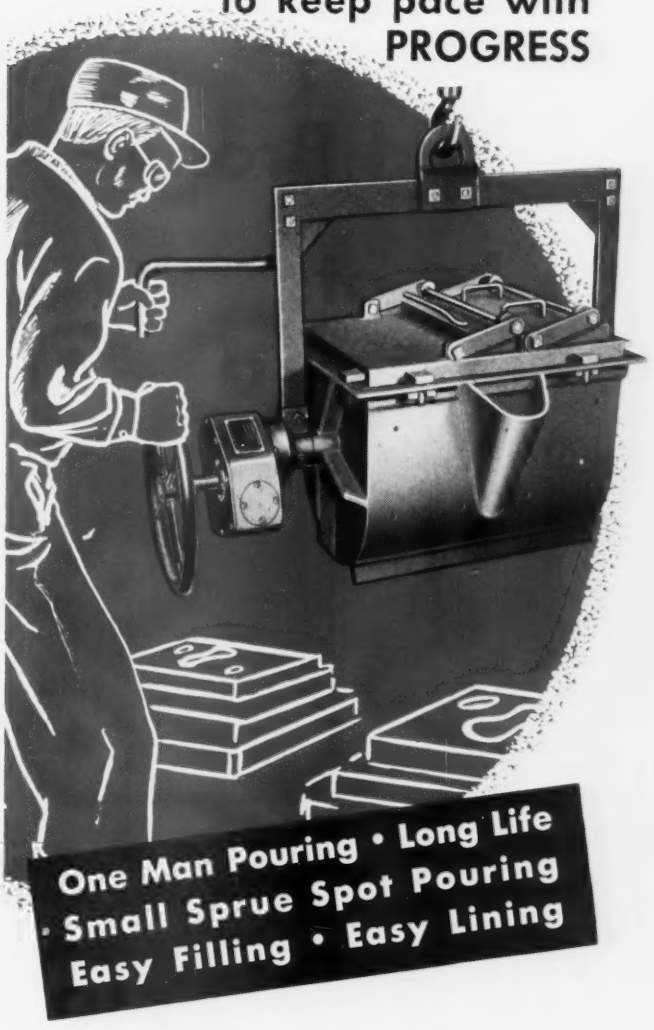

**One Man Pouring • Long Life**
**Small Sprue Spot Pouring**
**Easy Filling • Easy Lining**

One of America's largest manufacturers requested a ladle capable of fast, economical spot pouring of shell molds. This special ladle was Industrial's Job Engineered solution to this foundry problem.

For high speed production line pouring, you can lower labor costs . . . reduce rejects . . . protect flasks and conveyors from spillage . . . and increase production with production-planned foundry equipment by Industrial.

For nearly half a century, Industrial has contributed to Foundry Progress by offering constantly improved pouring and handling equipment featuring forward-looking designs.

Let Industrial help you solve your pouring problems. Write today for latest catalog.

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Zircon Sand
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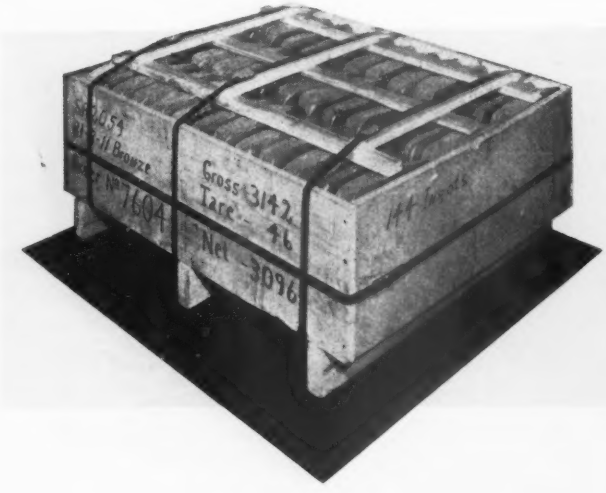
# SCHUMANN

## • Brass
## • and Bronze
## • Ingots




These good, high quality ingots are now shipped to you in sturdily built, expendable wooden pallets. Well marked for easy identification and inventory control, the pallets may be handled easily by fork-lift trucks.

The brass and bronze ingots, of course, are consistently top grade. They are produced in a new, modern, up-to-date plant under the supervision of expert metallurgists and technicians.

**SCHUMANN BRASS & BRONZE INGOTS** carry our reputation—so we don't *lightly* fill *any* order. We have prepared a complete spiral-bound specification folder, which we think you will find of interest. Write for your free copy today.

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**SMELTERS & REFINERS**
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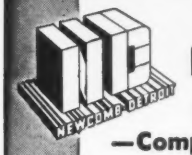
PIONEERS IN ENGINEERING, MANUFACTURING & INSTALLING OF

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**DUST COLLECTORS**
**Recirculating Water Type —Compact—Efficient—Proven by Foundry Users**

•

*"Scroll-Aire"* **CORE OVENS**
**More Air Circulation— Faster Bake and Better Cores**

**ESTABLISHED 1912**
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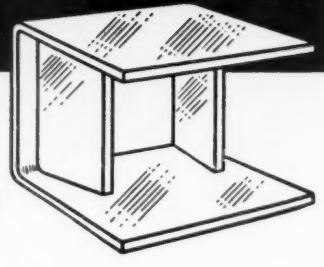
***Extra strong, patented design saves money, permits thinner gauges***



*Buffalo*
**CHAPLETS**

Easier burning in without chilling is the direct benefit of Buffalo Patented Angle Stem and Double Angle Chaplets. The fact that they have added strength, by reason of their exclusive design, permits them to be made in thinner gauges . . . *at savings to you!* In addition, thorough coating makes instant fusion with molten metal a certainty!

Make sure of meeting your chaplet needs exactly. The "Buffalo" line is one of the most extensive in the world.

Complete information in Catalog No. 16

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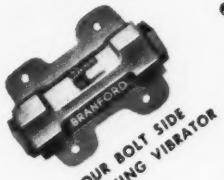
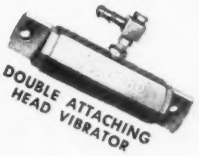
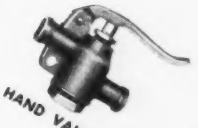

FOUR BOLT SIDE MOUNTING VIBRATOR

HOSE CLAMP

TWO BOLT SIDE MOUNTING VIBRATOR


DOUBLE ATTACHING HEAD VIBRATOR

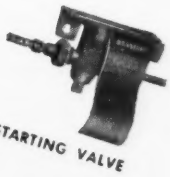
1915
BRANFORD
VIBRATORS
USA


HAND VALVE

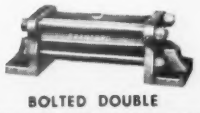
RENEWABLE NOZZLE CLEANER & SPRAYER

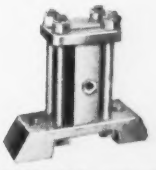
CLEANER & SPRAYER

HOSE NIPPLE


STARTING VALVE

HOSE ELBOW


BOLTED DOUBLE ATTACHING HEAD VIBRATOR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**Complete line**—Choose from our forty products, liquid and dry, ($2Na_2O:SiO_2$ to $Na_2O:3.75\ SiO_2$)—a silicate for every need.

**Controlled quality**—Careful checking of raw materials and the finished silicates insures uniform quality, shipment after shipment. With PQ silicate it is easier to maintain close control in your operations.

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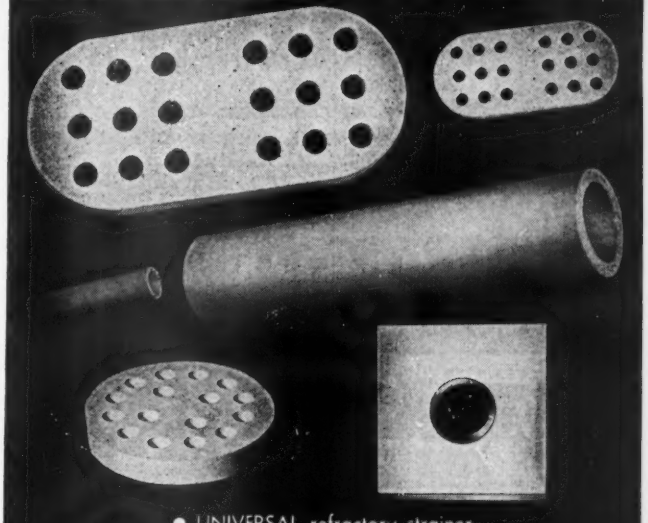
# UNIVERSAL REFRACTORY FOUNDRY SUPPLIES



● UNIVERSAL refractory strainer cores, pouring pipes, and breaker cores are *custom-made*.

Write today, giving specifications, for quotation on Universal refractory foundry items.

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# Ni-Rod electrode salvages castings...

## easy as

**1** **Chalk one up for salvage with Ni-Rod* electrode.** It's a 45-pound cast iron pump casing with a 4½- by 1½-inch blowhole on its flange. A serious flaw! But the foundry's weldor fixed it easily. He chipped out the defective area. Then he started welding with Ni-Rod electrode.

**2** **Look at the flange now.** Ten beads of Ni-Rod produced this build-up of sound weld metal. *Looks count, too!* Notice the good color match between weld and parent cast iron. And here's another big advantage of Ni-Rod electrode: nine out of ten jobs need no preheat or post-heat.

**3** **Welds made with Ni-Rod electrode machine easily.** First, the casting's welded flange face was turned down on a lathe. Next, the flange bore was machined. Finally, bolt holes were drilled and tapped through weld, fusion zone, and cast metal. No difficulty was encountered during *any* of the finishing operations!

**Get this new guide to cast iron welding**

Do you want to know more about money-saving Ni-Rod and Ni-Rod "55"* electrodes? "A Handy Guide to Welding Cast Iron" gives helpful tips on salvaging castings, weld preparation, technique, getting maximum machinability. A copy is yours for the asking. Write:

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**EF** GAS, OIL AND ELECTRIC **FURNACES**
*For all annealing and heat treating requirements*
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HIGH SILICA QUARTZITE PEBBLES

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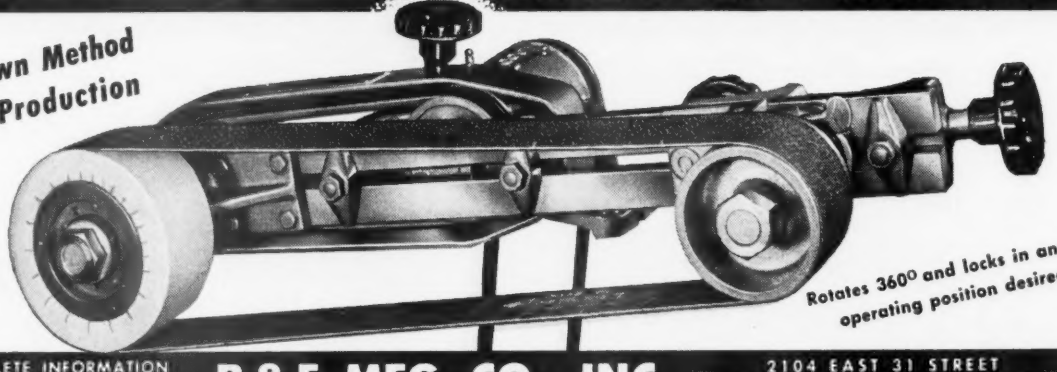
**MODEL 500 CONTACT WHEEL BELT GRINDER**

*The Fastest Known Method of Increasing Production*



Rotates 360° and locks in any operating position desired.

WRITE FOR COMPLETE INFORMATION ON INCREASING YOUR PRODUCTION

**B&E MFG. CO., INC.**

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## No. 4 DAYTON RING VALVE BENCH RAMMER

**MORE POWER—MORE SPEED**

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

*Send for Bulletin 300*

**DAYTON PNEUMATIC TOOL CO.**

*Manufacturers of Pneumatic Tools Since 1903*

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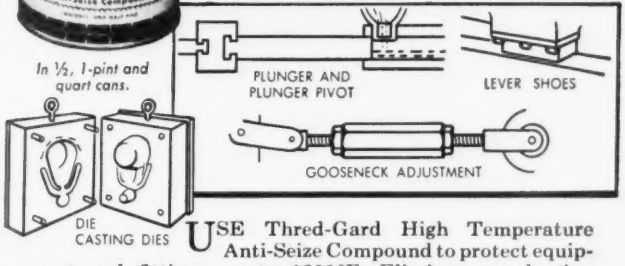
## HOLD DOWN THOSE DIE CASTING COSTS

*In ½, 1-pint and quart cans.*

***Protect the "hot spots" in your equipment . . . End seizing and galling of die fittings***




USE Thred-Gard High Temperature Anti-Seize Compound to protect equipment and fittings up to 1200°F. Eliminate production losses and maintenance costs due to heat strain, seizing and galling.

Here's what a drop or two of Thred-Gard will do:

*Die casting machines*—Reduce down time by insuring continuous, long lasting operation of plunger, plunger pivot, lever shoes and gooseneck adjustment.

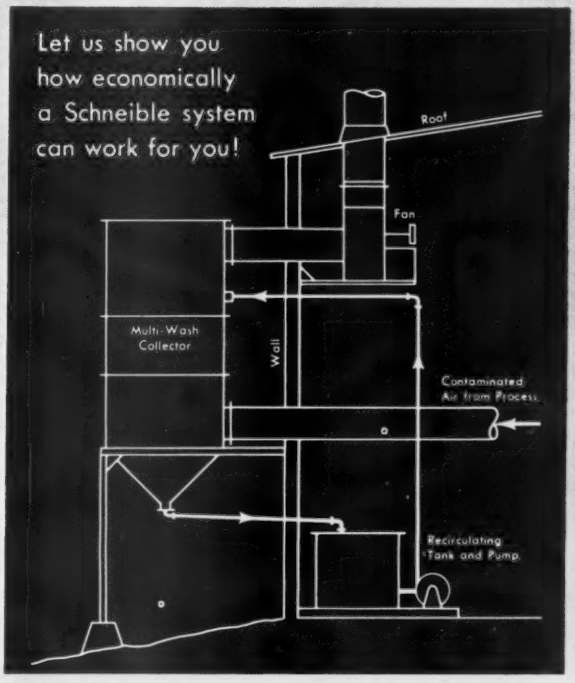
*Die casting dies*—Insure efficient, uninterrupted operation of ejector pins. Prevent thread fracture on screws and hollow head bolts due to seizing and galling—yet, initially, permit them to be drawn to a greater degree of tightness. Save money on your die casting operations. Ask about Thred-Gard. Request a free sample.

Crane Packing Company, 6457 Oakton St., Morton Grove, Illinois. (Chicago Suburb). *In Canada: Crane Packing Co., Ltd., Hamilton, Ont.*

JOHN CRANE **CRANE PACKING COMPANY** 38 YEARS INDUSTRIAL PROGRESS

## SPECIFY SCHNEIBLE DUST CONTROL

### for simplicity and efficiency




Wherever you see a Schneible Dust Control System you'll find an efficient, profitable operation.

Whether it be Cupola Collectors, Hoods for pouring, shakeout, casting cooling, grinding, tumbling or Multi-Wash Collectors in operation on one of its many diversified uses, you can be sure that economy and efficiency was a determining factor in the choice of Schneible Dust Control Equipment.

The simplicity of the design of Schneible Systems assures low maintenance cost and practically no sacrifice of valuable working space, while providing profitable production through better employee and public relations.

Be sure to include a Schneible survey of your needs when you consider the purchase of a dust control system. There's a system to fit your requirements, whether large or small.

**FREE Chart** **SCHNEIBLE**

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*Give you the most for your money!*

The finer grain of Zirconite* products offers cost-saving advantages in steel, iron, bronze, aluminum or magnesium foundry operations.

**ZIRCONITE* PASTE WASH**

Does not fuse with molten metal. Resists metal wetting. Prevents metal penetration. Produces smooth casting surfaces.

**ZIRCONITE* FLOUR**

Used as a filler in cores. Lowers permeability. Increases refractoriness.

**ZIRCONITE* SAND**

Eliminates the problems of burning-in and penetration. An excellent means of chilling heavy sections to promote directional solidification and to eliminate heavy risers.

Put the money-saving advantages of TAM* ZIRCONITE* products to work in your operation. Write our New York office for detailed information. Discuss them with our field engineers.

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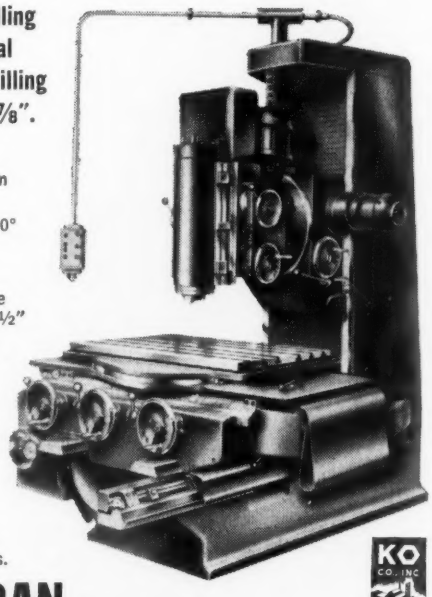
***You'd need several machines to do all the different jobs possible on one***

# BOKOE No. 3 Universal Miller

**For non-ferrous, cast iron and alloy steel tooling, patterns and production to close tolerances.**

**Use it for radial drilling in addition to vertical milling, universal milling and boring up to 11⅞".**



- Column swivels 180° in either direction
- Milling head swivels 90° in either direction
- 37½" throat
- Distance between table and spindle head 0-37½"
- Rotary table handles bulky work up to 8'2"
- Weight 7½ tons

Smaller models, too.
Write for complete details.

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KO CO., INC. INDUSTRIAL IMPORTERS

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**IF YOU WANT BETTER LUMBER** *for*

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Memo to foundry superintendents:

Edco Dowmetal Bottom Boards—have proven again and again that their light-weight characteristics make for safe, easy-to-handle, permanent equipment in any foundry.

Write or call for price schedule and list.

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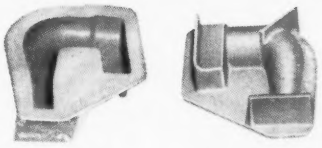
## THIRTY MINUTES FROM PRINT TO PATTERN



CONSIDERED impossible to make with uniform wall thickness of 3/16", in a reasonable length of time—the core dryer pattern above was finished in less than 30 minutes!

The pattern is light, durable and most important: accurate.

Bulletin F-6 will tell you how this pattern was made, with practically no hand work. There are many other practical, pattern-shop ideas in this 12-page booklet.

Write for it TODAY.

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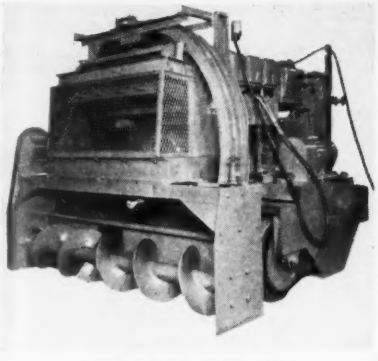
318 Park Avenue
New York 22, N. Y.

## GHW

**HOT BLAST CUPOLAS**
*Now available in United States*
**E. S. HARMAN CORP.**
Exclusive Licensee
205 W. Wacker Drive
Chicago 6, Illinois
**BOOTH 421, AFS Show, Atlantic City**

## RINGLIFT SAND CONDITIONER

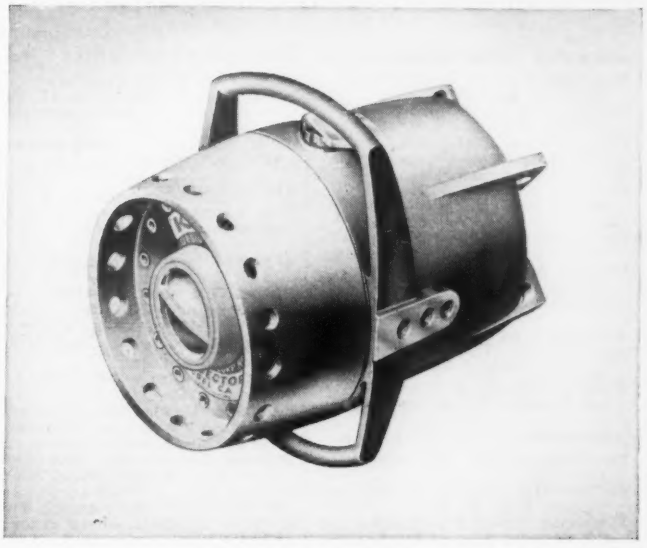


MODEL B34 RINGLIFT

Mixes, adds water, lifts all sand from floor, screens, magnetically separates, aerates. Cools hot sand. Cuts swath to 104", turns in 63" radius, Straddles 24" high x 70" windrows. Capacity to one ton per minute. Three foundry-proved sizes.

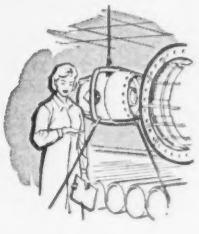
**STATES ENGINEERING CORPORATION**
922 W. Berry Street
Ft. Wayne, Indiana

## The KEL-RAY® Projector
### a portable tool for low-cost radiography



Here is a new development employing radioactive cobalt, iridium, or cesium as a source of gamma rays. One of the most practical means yet devised for industrial non-destructive testing, the KEL-RAY Projector lowers costs and simplifies procedures wherever radiographic testing can be applied. Here's why:

**PORTABLE**—Requiring no external power, the KEL-RAY Projector is available in three portable sizes, the smallest of which can be moved by hand.



**SAFE**—Ruggedly constructed, equipped with tamper-proof shutter, it is designed and built to keep radiation leakage at a minimum—well below AEC and ICC safety requirements.

**ECONOMICAL**—Initial and operating costs are low. Requires no maintenance during life of isotope. Set-up time and man-power are minimized.

**EASY TO USE**—Simple to operate on light or heavy material up to 8 inches thick by anyone properly trained.

*For information on how the KEL-RAY Projector can meet your needs, write for Bulletin P196F.*

**METAL & THERMIT CORPORATION**
**General Offices: Rahway, N. J.**

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Alloys & Chemicals Mfg. Co., Inc., 4365 Bradley Rd., Cleveland 9, Ohio
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Division, American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Frontier Bronze Corp., 818 Elmwood Ave., Niagara Falls, N. Y.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.
Kaiser Aluminum & Chemical Corp., Kaiser Bldg., Oakland 12, Calif.
George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.
Sonken-Galamba Corp., Kansas City 18, Kansas.
Western Metal Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

**ANNEALING—See FURNACES, (Heat Treating and Annealing)**

**ANTI-PIPING COMPOUNDS—See RISER COMPOUNDS**

**ARGON—See GAS**

**ASSOCIATIONS**
Crucible Manufacturers Association, 90 West St., New York 6, N. Y.
Gray Iron Founders Society, Inc., 210 National City Bank Bldg., Cleveland 14, Ohio.

**BAND SAWS—See SAWS**

**BANDS (Snap Flask)**
Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, O.

**BARS (Steel)**
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, O.

**BEARINGS (Anti-Friction, Roller and Ball)**
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Timken Roller Bearing Co., Canton 6, O.

**BEARINGS (Sintered Bronze)**
United States Graphite Co., Saginaw, Mich.

**BELT LACINGS**
Flexible Steel Lacing Co., 4667 Lexington St., Chicago 44, Illinois.

**BELTING (Conveyor, Elevator, Power Transmission)**
C. R. Daniels Inc., Daniels, Md.
B. F. Goodrich Co., Akron, Ohio
Great Western Mfg. Co., Leavenworth, Kansas.
Hewitt Rubber Div., Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.
Imperial Belting Co., 1800 So. Kilbourn Ave., Chicago 23, Ill.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Raybestos-Manhattan Inc., Manhattan Rubber Division, Passaic, N. J.

**BENTONITE**
Baroid Division, 637 Railway Exchange Bldg., 80 East Jackson Blvd., Chicago 4, Ill.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carpenter Brothers Inc., 606 West Michigan, Milwaukee 2, Wis.
Eastern Clay Products, Dept., International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Magnet Cove Barium Corp., 817 Mishawaka Ave., Mishawaka, Ind.
Whitehead Bros., 324 West 23rd St., New York 11, N. Y.

**BERYLLIUM COPPER ALLOYS**
Beryllium Corp., Reading, Pa.

**BINS (Storage)—See SAND STORAGE BINS and GATES**

**BLACKING (Mold, Core)**
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Stevens, Frederic B., Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

**BLADES (Shot Blast Equipment)**
Pangborn Corp., Hagerstown, Md.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

**BLAST CLEANING EQUIPMENT (Airless or Pneumatic)**
Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.
Hydro Blast Corp., 10265 Franklin Ave., Franklin Park, Ill.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

**BLAST CLEANING EQUIPMENT (Hydraulic)**
Pangborn Corp., Hagerstown, Md.

**BLAST METERS**
Foxboro Company, Foxboro, Mass.

**BLOWERS**
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., 266 Central Ave., Louisville 8, Ky.
Campbell-Hausfeld Co., Harrison, O.
Chicago Blower Corp., 9867 Pacific Ave., Franklin Park, Ill.
Ingersoll-Rand Co., 11 Broadway, New York, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland 5, Ohio
Spencer Turbine Co., Hartford, Conn.
Stroman Furnace & Engineering Co., Division of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

**BOND CLAY—See CLAY (Bonding)**

**BOOKS (Technical)**
Penton Publishing Co., 1213 West 3rd St., Cleveland 13, O.

**BOTTOM PLATES and BOARDS**
Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Dougherty Lumber Co., 12100 Euclid Ave., Cleveland 6, Ohio
Foundries Materials Co., Coldwater, Mich.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
West Way Pattern & Mfg. Co., 9617 Clinton Rd., Cleveland 9, Ohio

**BOWLS and SHANKS**
Industrial Equipment Co., Minster, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**BOXES (Stacking, Tote)**
Bigelow-Garvey Lumber Co. 325 West Huron, Chicago 10, Ill.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Republic Steel Corp., 3100 E. 45th St. Cleveland 27, Ohio.

**BRAKES (Magnetic)**
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

**BRASS AND BRONZE INGOT**
Federated Metals Div. of American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.
I. Schumann & Co., 4391 Bradley Rd., Cleveland 4, Ohio
Western Metal Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

**BRINELL TESTING EQUIPMENT**
King Tester Corp., 440 North 13th St., Philadelphia, Pa.

**BRIQUETS—See Type of Compound**

**BRIQUETTING MACHINERY (Metal)**
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.

**BRUSHES (Bristle)**
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.

**BRUSHES (Electrical)**
Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.
U. S. Graphite Co., Saginaw, Mich.

**BRUSHES (Wire)**
Hewitt Rubber Division, Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.

**BUCKETS (Elevating, Clam Shell, Drag Line, Grab, Loader, Dumping)**
Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.
Penn Iron Works, Inc., Reading, Pa.

**BUILDING and ENGINEERING SERVICE**

American Bridge Div., United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.

**BURNERS (Acetylene, Oil, Gas, Powdered Coal, Stoker)**

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Johnston Mfg. Co., Minneapolis 13, Minn.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
North American Mfg. Co., 4455 E. 71st St., Cleveland, Ohio
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

**BUSHINGS—See FLASK BUSHINGS and PINS**

**CADMIUM INGOT**

Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

**CALCIUM BORIDE**

Molybdenum Corporation of America, Pittsburgh 19, Pa.

**CALCIUM MOLYBDATE**

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.

**CAR MOVERS**

Frank G. Hough Co., Libertyville, Ill.
Jeffrey Mfg. Co., Columbus 16, Ohio.

**CARBON BOOSTER**

Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., Hancock Bldg., Niagara Falls, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N.Y.
United States Graphite Co., Saginaw, Mich.

**CARBON DIOXIDE**

Pure Carbonic Div. Air Reduction Co., 60 East 42nd St., New York 17, N. Y.

**CARBON DIOXIDE (Supply Systems)**

Pure Carbonic Div. Air Reduction Co., 60 East 42nd St., New York 17, N. Y.

**CARS (Core Oven)**

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

**CARS (Mold Drying)**

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

**CASTING GRIPS (Air Powered)**

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

**CASTING MACHINES (Centrifugal)**

Centrifugal Casting Mach. Co., Tulsa, Okla.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

**CASTING MACHINES (Die)**

Kux Machine Co., 6725 North Ridge Ave., Chicago 26, Ill.

**CASTING MACHINES (Permanent Mold)**

Centrifugal Casting Machine Co., Tulsa, Okla.

**CASTING SEALER—See Impregnating Systems**

**CASTINGS**

City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Link-Belt Company, Prudential Plaza, Chicago 1, Ill.
Wellman Bronze & Aluminum Co., 12800 Shaker Blvd., Cleveland 20, Ohio.

**CEMENT (Metallic)**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Smooth-On Manufacturing Co., 570 Communipaw Ave., Jersey City 4, N. J.
Frederic B. Stevens, Inc., Detroit 16, Mich.

**CEMENT (Refractory)**

Bay State Abrasive Products Co., Westboro, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Ironton Fire Brick Co., Ironton, O.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories, Mexico, Mo.
Mullite Refractories, Shelton, Conn.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
Chas. Taylor Sons Co., 710 Burns St., Cincinnati 4, Ohio

**CHAIN (Hoist, Conveyor, Drive, Sling, etc.)**

American Chain Div., American Chain & Cable Co. Inc., York, Pa.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonowanda, N. Y.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
S. G. Taylor Chain Co., Hammond, Ind.

**CHAPLETS**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Cleveland Chaplet & Mfg. Co., 26470 Lakeland Blvd., Cleveland 23, Ohio.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee 4, Wis.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, O.
Smith & Richardson Mfg. Co., Geneva, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.

**CHEMICALS**

General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio
Hercules Powder Co., Wilmington 99, Del.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Wayne Chemical Products Co., Copeland Street & M.C.R.R., Detroit, Mich.

**CHILLS**

Fanner Mfg. Co., Brookside Park, Cleveland 9, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 So. 4th St., Milwaukee 4, Wis.
Standard Horse Nail Corp., New Brighton, Pa.

**CHILL COATINGS**

Acheson Colloids Co., Port Huron, Mich.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio

**CHILL NAILS—See NAILS (chill)**

**CHIPPERS—See PNEUMATIC TOOLS**

**CHISELS (Chipping) — See PNEUMATIC TOOLS and CHISELS**

**CHROMIUM (Briquets)**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

**CLAMPS (Flask)**

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 3, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., Canton, Ohio.
Sterling Wheelbarrow Co., 1700 W. Walker St., Milwaukee 14, Wis.

**CLAY (Bonding)**

Baroid Division, 637 Railway Exchange Bldg., 80 East Jackson Blvd., Chicago 4, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
Eastern Clay Products Dept. International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**CLAY (Refractory)—See REFRACTORIES**

**CLEANING—See BLAST CLEANING EQUIPMENT**

**CLEANING COMPOUNDS**

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

**CLUTCHES (Magnetic, Friction)**

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

**COATINGS—See CORE and MOLD WASH**

**COKE (Oven)**

Alabama By-Products Corp., Post Office Box 354, Birmingham 1, Ala.
DeBardeleben Coal Corp., 2201 First Ave., N., Birmingham 3, Ala.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Coal & Coke Co., 8 So. Michigan Ave., Chicago 3, Ill.
Semet Solvay Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

**COKE (Petroleum)**

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N.Y.
Republic Coal and Coke Co., 8 S. Michigan Ave., Chicago 3, Ill.

**CONVERTER BLOWERS—See BLOWERS**

**CONVERTERS (Bessemer)**

Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**CONVEYOR DESIGN**

Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.

**CONVEYORS (Chain)**

Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Richards-Wilcox Mfg. Co., 174 Third St., Aurora, Ill.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

**CONVEYORS (Fabric, Rubber Belt)**

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
B. F. Goodrich Co., Akron 18, Ohio
Great Western Mfg. Co., Leavenworth, Kansas.
Imperial Belting Co., 1800 S. Kilbourn Ave., Chicago 23, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth Columbus 16, O.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

**CONVEYORS (Gravity Roller)**

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.
Webster Mfg. Co., Tiffin, Ohio.

**CONVEYORS (Live Roller)**

Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.
Standard Conveyor Co., North St. Paul 9, Minn.

**CONVEYORS (Magnetic)**

Robinson Air Activated Conveyor Systems, 80 Fifth Ave., New York, N. Y.
Stearns Magnetic Inc., 635 South 28th St., Milwaukee 46, Wis.

**CONVEYORS (Metal Belt)**

May-Fran Engineering, Inc., 1710 Clarkstone Road, Cleveland 12, Ohio.

**CONVEYORS (Mold)**

Bartlet & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Logan Co., 580 Cabel, Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Service Conveyor Co., 7764 Bryden Ave., Detroit 10, Mich.

**CONVEYORS (Overhead Monorail)**

American Monorail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 E. 283rd St., Wickliffe, O.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Mathews Conveyer Co., 104 Tenth St., Ellwood City, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Penn Iron Works Inc., Reading, Pa.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Richards-Wilcox Mfg., 174 Third St., Aurora, Ill.
Whiting Corp., Harvey, Ill.

**CONVEYORS (Pneumatic)**

Fuller Company, Catasauqua, Pa.
Whirl-Air Flow Corp., 4937 West Fullerton, Chicago, Ill.

**CONVEYORS (Portable)**

Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

**CONVEYORS (Vibrating, Oscillating)**

Ajax Flexible Coupling Co., Westfield, N. Y.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

**COPPER**

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

**COPPER SHOT**

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

**CORE BINDERS**

Acme Resin Corp., Forest Park, Ill.
American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Archer-Daniels-Midland Co., Foundry Products Div., 2191 W. 110th St., Cleveland 2, O.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Carver Foundry Products Co., Muscatine, Iowa.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
E. I. Du Pont de Nemours & Co. Inc., Wilmington 98, Delaware.
Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
Eastern Clay Products Dept. International Mineral & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
B. F. Goodrich Chemical Co., Rose Building, Cleveland 15, Ohio
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Peterson Foundry Supply Co., 39th Place & Racine, Chicago, Ill.
Philadelphia Quartz Co., 1062 Public Ledger Bldg., Philadelphia 6, Pa.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Schenectady Resins, P.O. Box 1046, Schenectady, N. Y.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
G. E. Smith, Inc., 246 Washington Rd., Pittsburgh 16, Pa.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Co., Erie, Pa.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**CORE BLOWER BUSHINGS**

Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

**CORE BLOWING MACHINES**

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products Co., Muscatine, Iowa
Wm. Demmler & Bros. Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

**COREBOXES**

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.

**CORE COLORING**

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

**CORE DRAWING MACHINES**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

**CORE DRIERS**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

**CORE GRINDERS (Power Operated)**

Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Sutter Products Co., Dearborn, Mich.

**CORE KNOCKOUT MACHINES**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N.Y.
Pangborn Corp., Hagerstown, Md.
Simplicity Engineering Co., Durand, Mich.

**COREMAKING MACHINES**

Beardsley & Piper Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone-Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div. Pettibone-Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 Pierce St., Milwaukee 4, Wis.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

**CORE OILS—See CORE BINDERS**

**CORE and MOLD OVENS**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Girdler Corp., Thermex Division, 224 E. Broadway, Louisville 2, Ky.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Michigan Oven Co., 419 Brainard St., Detroit 1, Mich.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N.Y.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Stroman Furnace & Engineering Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

**CORE PASTE**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Corn Products Refining Co., 17 Battery Pl., New York 4, N. Y.
Delta Oil Products Co., Milwaukee 9, Wis.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**CORE PLATES (Steel, Aluminum, Magnesium, Asbestos)**

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Champion Division, Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Crescent Brass & Pin Co., 5766 Tramrail Ave., Detroit, Mich.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N.E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
West Way Pattern & Mfg. Co., 9617 Clinton Rd., Cleveland 9, Ohio

**CORE ROD STRAIGHTENING and CUTTING MACHINERY**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Kane & Roach, Syracuse, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

**CORE SAND—See SAND**

**CORE SAND MIXERS—See SAND PREPARATION EQUIPMENT**

**CORE STRIPPERS—See CORE DRAWING MACHINES**

**CORE TESTING EQUIPMENT**

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.

**CORE TRUCKS—See TRUCKS (Core)**

**CORE VENTS**

Demmler, Wm., & Bros., Kewanee, Ill.
Smillie, C. M. & Co., 1124 Woodward Heights Blvd., Ferndale 20, Mich.

**CORE and MOLD WASH**

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills, Inc., Asbury, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carborundum Co., Perth Amboy, N. J.
Cities Service Oil Co., 20 N. Wacker Dr., Chicago 6, Ill.
Corn Products Refining Co., 17 Battery Pl., New York City 4.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Rubber Inc., 6100 River Road, Washington 16, D. C.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio
Foundries Materials Co., Coldwater, Mich.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Mullite Refractories, Shelton, Conn.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N.Y.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Peterson Foundry Supply Co., 39th Place & Racine, Chicago, Ill.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Stevens, Frederic B., Inc., Detroit 26, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Titanium Alloy Mfg. Div. National Lead Co., 111 Broadway, New York 6, N. Y.
United Oil Co., Erie, Pa.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**CORE WIRES**

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.

**CORES (Strainer, Ceramic)**

Louthan Corp., East Liverpool, Ohio.
Porcelain Products, Inc., Findlay, Ohio.
Universal Clay Products, Sandusky, Ohio.

**COUPLINGS (Air, Hydraulic)**

Aeroquip Corp., Jackson, Mich.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N.Y.
Cleco Division of Reed Roller Bit Co., Houston, Tex.
C. B. Hunt & Sons Inc., Salem, Ohio.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.

**COUPLINGS (Flexible, Shaft)**

Ajax Flexible Coupling Co., Westfield, N. Y.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

**CRANES (Bucket)**

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CRANES (Gantry)**

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Modern Equipment Co., Port Washington, Wis.

**CRANES (Jib)**

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CRANES (Monorail—Electric and Hand)**

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Erie Strayer Co., Erie, Pa.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Industrial Crane & Hoist Corp., 1536 South Paulina St., Chicago 8, Ill.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., 360 Schuyler Ave., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CRANES (Self-Propelled)**

Austin Western Co., 601 North Farnsworth, Aurora, Ill.
Baker-Raulang Company, 1250 West 80th St., Cleveland 2, Ohio.
Coles Cranes Inc., Joliet, Ill.
Modern Equipment Co., Port Washington, Wis.
Silent Hoist & Crane Co., 835 63rd St., Brooklyn 20, N. Y.

**CRUCIBLES**

Ajax Electrothermic Corp., Trenton, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Lava Crucible Co., Pittsburgh, Pa.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ross-Tacony Crucible Co., Tacony, Philadelphia, Pa.
Vesuvius Crucible Co., Swissvale, Pa.

**CRUCIBLE POURING DEVICES**

Modern Equipment Co., Port Washington, Wis.

**CRUSHERS (Core)**

Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Simplicity Engineering Co., Durand, Mich.

**CUPOLAS**

Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CUPOLAS (Hot Blast Equipment)**

E. S. Harman Corp., 205 West Wacker Drive, Chicago 6, Ill.
Modern Equipment Co., Port Washington, Wis.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y

**CUPOLA BLOWERS**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Spencer Turbine Co., Hartford, Conn.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CUPOLA CHARGING MACHINES**

American MonoRail Co., 13104 Athens Ave., Cleveland 7, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, O.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**CUPOLA CONTROL EQUIPMENT**

Foxboro Company, Foxboro, Mass.

**CUPOLA DUST ARRESTORS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS**

**CUPOLA LIGHTERS**

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Hickman-Williams Co., Union Commerce Bldg., Cleveland 14, Ohio.
Whiting Corp., Harvey, Ill.

**CUPOLA LININGS—See REFRACTORIES**

**CUPOLA PATCHING GUNS—See REFRACTORY GUNS**

**CUTOFF MACHINES (Abrasive)**

DoAll Co., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh, Pa.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

**CUTOFF WHEELS**

Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., Perth Amboy, N. J.
Electro Refractories & Abrasives Corp., Vars Bldg., Buffalo 2, N. Y.
Macklin Company, Jackson, Mich.
Norton Company, Worcester 6, Mass.
Raybestos-Manhattan, Inc. Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.

**CUTTING OILS**

E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

**CYLINDERS (Air)**

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio
Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

**CYLINDERS (Hydraulic)**

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

**DARK ROOM ACCESSORIES—See X-RAY FILM and ACCESSORIES**

**DEGASIFIERS and DEOXIDIZERS**

Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

**DESIGN TESTING**

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

**DESULPHURIZERS**

Carpenter Brothers Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Cleveland Flux Co., 1026 Main St., Cleveland 13, O.
Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio
Hercules Powder Co., Wilmington 99, Del.
Modern Equipment Co., Port Washington, Wis.
Olin Mathieson Chemical Corp., 60 Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.
Solvay Process Division Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**DOWEL PINS**

Standard Horse Nail Corp., New Brighton, Pa.

**DRILLS (Electric)**

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.

**DRILLS (Pneumatic)**

Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
Gardner-Denver Co., Quincy, Ill.
Schramm Inc., West Chester, Pa.

**DRIVES (Gear, Variable Speed)**

Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

**DRUMS (Magnetic)—See SEPARATORS (Magnetic)**

**DUMP HOPPERS**

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, O.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

**DUMP TRUCKS**

Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.
Prime Mover Co., Muscatine, Iowa
Tractomotive Corp., Deerfield, Ill.

**DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS**

American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Chicago Blower Corp., 9867 Pacific Ave., Franklin Park, Ill.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Martin Equipment Co., P.O. Box 173, Wabash, Ind.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
Pangborn Corp., Hagerstown, Md.
J. O. Ross Engineering Corp., 444 Madison Ave., New York 17, N. Y.

Schneible Co., Claude B., 212 Stephenson Bldg., P.O. Box 81, North End Station, Detroit 2, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.
Wheelabrator Corp., Mishawaka, Ind.

**DYES AND CHEMICALS**

Eaton Chemical & Dyestuff Co., 1490 Franklin, Detroit, Mich.

**ELECTRIC FURNACES (See Furnaces, Electric)**

**ELECTRODES (Graphite and Amorphous)**

Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Co., 30 E. 42nd St., New York 17, N. Y.

**ELEVATORS (Bucket)**

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Great Western Mfg. Co., Leavenworth, Kansas.
Jeffrey Mfg. Co., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

**ELEVATORS (Pneumatic, Material Handling)**

Fuller Co., Catasauqua, Pa.

**ENGINEERING SERVICE (Foundry)**

Edwin S. Carman, 1643 Lee Road, Cleveland 18, Ohio.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Lester B. Knight & Associates, Inc., 549 West Randolph St., Chicago 6, Ill.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Westover Corp., 3110 W. Fond du Lac Avenue, Milwaukee 10, Wis.

**EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS**

**FABRICATORS (Metal)**

Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Penn Iron Works, Inc., Reading, Pa.
Roura Iron Works, 1405 Woodland Ave., Detroit 11, Mich.

**FACINGS**

Asbury Graphite Mills, Inc., Asbury, N. J.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Stevens Inc., Frederic B., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**FANS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS**

**FASTENERS (Conveyor Belt)**

Flexible Steel Lacing Co., 4667 Lexington St., Chicago 44, Illinois.

**FEEDERS (Belt)**

Bartlett & Snow Co., C. O. 6201 Harvard Ave., Cleveland 5, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.

**FEEDERS (Rotary)**

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Fuller Company, Catasauqua, Pa.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Newaygo Engineering Co., Newaygo, Mich.

**FEEDERS (Vibrating)**

Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Carrier Conveyor Corp. Frankfort Ave., at Clifton, Louisville 6, Ky.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Robins Conveyors, Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

**FERROBORON**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

**FERROCHROME**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro Alloys Corp., Canton 9, Ohio
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

**FERROCOLUMBIUM**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**FERROMANGANESE**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro Alloys Corp., Canton 9, Ohio

**FERROMOLYBDENUM**

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

**FERROSILICON**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Ohio Ferro Alloys Corp., Canton 9, Ohio
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

**FERROTITANIUM**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Titanium Alloy Mfg. Div. National Lead Co., 111 Broadway, New York 6, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

**FERROTUNGSTEN**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Molybdenum Corp. of America, Pittsburgh 19, Pa.

**FERROVANADIUM**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

**FILTERS (Air)**

American Air Filter Co., 266 Central Ave., Louisville 8, Ky.

**FIRE BRICK, CLAY, SAND, STONE—See REFRACTORIES**

**FITTINGS (Pipe)**

Pipe Line Development Co., 5700 Detroit, Cleveland, Ohio

**FLASK BANDS—See BANDS (Snap Flask)**

**FLASK BUSHINGS, PINS and FITTINGS**

The Adams Co., Dubuque, Iowa.
Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Smillie & Co., C. M., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Universal Engineering Co., Frankenmuth, Mich.

**FLASK FILLERS**

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Jeffrey Mfg. Co., Columbus 16, O.

**FLASK LIFT MACHINES—See PATTERN DRAW MACHINES**

**FLASKS (Aluminum, Magnesium)**

Adams Co., Dubuque, Iowa.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

**FLASKS (Slip)**

Adams Co., Dubuque, Iowa
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

**FLASKS (Snap)**

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Stevens, Inc., Frederic B., Detroit 16, Mich.

**FLASKS (Steel)**

Black, Sivalls & Bryson, Inc., 7500 E. 12th St., Kansas City 6, Mo.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Shanafelt Mfg. Co., 3623 Winfield Way, N. E., Canton 5, Ohio.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

**FLASKS (Wood)**

Adams Co., Dubuque, Iowa.

**FLOORING (Non-Slip)**

Norton Co., Worcester 6, Mass.

**FLUXES**

Cleveland Flux Co., 1026 Main St. Cleveland 13, Ohio.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
General Chemical Division, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Pittsburgh Metals Purifying Co., 1352 Marvista St., Pittsburgh 12, Pa.

**FLUXES (Soldering, Welding and Tinning)**

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**FOUNDRY ENGINEERS (See ENGINEERING SERVICE)**

**FOUNDRY LAYOUT and METHODS (See ENGINEERING SERVICE)**

**FOUNDRY NAILS**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Standard Horse Nail Corp., New Brighton, Pa.

**FOUNDRY SUPPLY HOUSES**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Combined Supply & Equipment Co., Inc., 215 Chandler St., Buffalo 7, N. Y.
Eastern Clay Products, Dept. International Minerals & Chemical Corp., 20 N. Wacker Drive, Chicago 6, Ill.

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundries Materials Co., Coldwater, Mich.
Stevens, Inc., Frederic B., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

**FURNACE BLOWERS—See BLOWERS**

**FURNACE LINING—See REFRACTORIES**

**FURNACES (Air)**

Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**FURNACES, (Electric Melting)**

Ajax Electrothermic Corp., Trenton, N. J.
Ajax Engineering Corp., Trenton, N. J.
American Bridge Co., Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co., Bay City, Mich.
Inductotherm Corp., 412 Illinois Ave., Delanco, New Jersey
Lectromelt Furnace Co. Div. McGraw Electric Co., P.O. Box 1125, Pittsburgh, Pa.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Swindell-Dressler, Pittsburgh, Pa.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**FURNACES (Gas or Oil Fired Melting)**

Campbell-Hausfeld Co., Harrison, O.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Reda Pump Co., Bartlesville, Okla.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

**FURNACES (Heat Treating and Annealing)**

Ajax Electric Co., Inc., Philadelphia 23, Pa.
Ajax Electrothermic Corp., Trenton, N. J.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Electric Furnace Co., West Wilson St., Salem, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
General Electric Co., Schenectady, N. Y.
Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.
Johnston Mfg. Co., Minneapolis 13, Minn.
Lanly Company, 750 Prospect Ave., Cleveland 15, Ohio.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Ohio Crankshaft Co., Tocco Division, 4620 E. 71st St., Cleveland 5, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**GAGGERS**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

**GAS (Oxygen, Acetylene, Carbon Dioxide, Industrial)**

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17 N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

**GAS BURNERS—See BURNERS**

**GENERATORS (Acetylene)**

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**GLOVES—See SAFETY CLOTHING**

**GOGGLES and EYE PROTECTORS**

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Willson Products Inc., Reading, Pa.

**GRAPHITE and GRAPHITE BRIQUETS**

Acheson Colloids Co., Port Huron, Mich.
Asbury Graphite Mills Inc., Asbury, N. J.
Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Frederic B. Stevens, Inc., Detroit 16, Mich.
United States Graphite Co., Saginaw, Mich.

**GRINDERS (Electric Portable)**

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Thor Power Tool Co., Aurora, Ill.

**GRINDERS (Flexible Shaft)**

Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.

**GRINDERS (Pneumatic Portable)**

Aro Equipment Corp., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Tex.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Thor Power Tool Co., Aurora, Ill.

**GRINDERS (Surface, Bench, Disc, Floor)**

B & E Mfg. Co., 2104 East 31st St., Kansas City 9, Mo.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
DoAll Co., Inc., Des Plaines, Ill.
Fox Grinders Inc., Oliver Bldg., Pittsburgh 22, Pa.
Standard Electrical Tool Co., 2488 River Road, Cincinnati 4, Ohio.
Thor Power Tool Co., Aurora, Ill.

**GRINDERS (Swing Frame)**

Fox Grinders, Inc., Oliver Bldg., Pittsburgh 22, Pa.
Sutter Products Co., Dearborn, Mich.

**GRINDING WHEELS**

Bay State Abrasive Products Co., Westboro Mass.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Cincinnati Milling Machine Co., Cincinnati 9, Ohio.
Macklin Co., Jackson, Mich.
Mid West Abrasive Co., Owosso, Michigan.
Norton Company, Worcester 6, Mass.
Peninsular Grinding Wheel Co., 729 Meldrum Ave., Detroit, Mich.
Raybestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J.
Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
United States Rubber Co., 4300 New Haven Ave., Fort Wayne 4, Ind.

**GRINDING WHEEL DRESSERS**

Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
Desmond-Stephen Mfg. Co., Urbana, O.
Norton Co., Worcester Mass.

**GRINDSTONES—See GRINDING WHEELS**

**GRIT—See SHOT and GRIT**

**HAMMERS (Chipping)—See PNEUMATIC TOOLS and CHISELS**

**HARDNESS TESTING EQUIPMENT**

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

**HEAT CONTROL AND RECORDING DEVICES**

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

**HEATERS (Space, Unit, Oven, Water)**

American Air Filter Co. Inc., Louisville 8, Ky.
Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., 619 Eighth St., S.E., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.

**HEATERS (High Frequency Electric)**

Ajax Electrothermic Corp., Trenton, N. J.

**HELMETS (Blasting)**

American Optical Co., Southbridge, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., Mishawaka, Ind.

**HELMETS (Welding)**

American Optical Co., Southbridge, Mass.

**HOISTS (Air)**

Aro Equipment Corp., Bryan, Ohio.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Miller Fluid Power Co., 2040 North Hawthorne, Melrose Park, Ill.

**HOISTS (Chain, Hand)**

Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Modern Equipment Co., Port Washington, Wis.

**HOISTS (Electric)**

Chisholm-Moore Hoist Div. Columbus-McKinnon Chain Corp., Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1155 East 283rd St., Wickliffe, O.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc., Muskegon, Mich.
Modern Equipment Co., Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp., Montour Falls, N. Y.

**HOISTS (Skip)**

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Quincy, Ill.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Robins Conveyors Div. Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**HOODS (Shakeout, Pouring and Cooling)—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS**

**HOSE (Air, Blasting, Water, Gas)**

Aeroqup Corp., Jackson, Mich.
Gardner-Denver Co., Quincy, Ill.
B. F. Goodrich Co., Akron, Ohio
Hewitt Rubber Div., Hewitt-Robins Inc., 240 Kensington Ave., Buffalo 5, N. Y.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Pangborn Corp., Hagerstown, Md.
Quaker Rubber Div. H. K. Porter Co., Tacony & Comly Sts., Philadelphia 24, Pa.
Raybestos-Manhattan, Inc., Manhattan Rubber Div., Passaic, N. J.
Schramm Inc., West Chester, Pa.

**HOSE FITTINGS and REELS**

Aeroquip Corp., Jackson, Mich.
A. Schrader's Son, 417 Vanderbilt Ave., Brooklyn 17, N. Y.

**HOT TOP MATERIALS—See RISER COMPOUNDS**

**HYDRAULIC CLEANING—See BLAST CLEANING EQUIPMENT**

**IMPREGNATING SYSTEMS and CASTING SEALER**

Prenco Products, Inc., 22022 Woodward Ave., Detroit 20, Mich.
Tousey Varnish Co., 520 West 25th St., Chicago 16, Ill.
Wayne Chemical Products Co., Copeland St. & M.C.R.R., Detroit 17, Mich.

**INGOT MOLDS**

Acme Foundry Co., Detroit 16, Mich.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co. Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**INGOTS—(See type of metal)**

**INOCULANTS**

Carborundum Co., Perth Amboy, N. J.
United States Graphite Co., Saginaw, Mich.

**INSPECTION EQUIPMENT**

Allis-Chalmers, Milwaukee 1, Wis.
Dietert, Harry W., 9330 Roselawn Ave., Detroit 4, Mich.
Detroit Testing Machine Co., 9390 Grinnell Ave., Detroit 13, Mich.
Eastman Kodak Co., Rochester, N. Y.
King Tester Corp., 440 North 13th St., Philadelphia, Pa.
Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.
Steel City Testing Machines Inc., 8817 Lyndon, Detroit 21, Mich.

**IRON CEMENT**

Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N. J.

**IRON ORE**

Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, O.

**IRON OXIDES**

Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Delta Oil Products Co., Milwaukee 9, Wis.
Tamms Industries Inc., 228 No. La Salle St., Chicago 1, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.

**JACKETS (Mold)—See MOLD JACKETS**

**LABORATORY EQUIPMENT (Chemical)**

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Great Western Mfg. Co., Leavenworth, Kansas.

**LABORATORY EQUIPMENT (Physical)**

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Norton Co., Worcester 6, Mass.

**LADLES**

Industrial Equipment Co., Minster, O.
Modern Equipment Co., Port Washington, Wis.
Spincraft Inc., 4122 W. State St., Milwaukee 8, Wis.
Federic B. Stevens, Inc., Detroit 16, Mich.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**LADLE LININGS—See REFRACTORIES**

**LEAD**

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.
George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

**LIFT TRUCKS (See Trucks, Power Lift)**

**LINSEED OIL**

Hercules Powder Co., Wilmington 99, Del.
United Oil Co., Erie, Pa.

**LITHIUM**

Lithium Corp. of America, Rand Tower, Minneapolis, Minn.

**LOADERS**

Clearfield Machine Co., Clearfield, Pa.
Modern Equipment Co., Port Washington, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

**LOADERS (Front-End)**

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.
Clark Industrial Truck Div. Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.
Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon
Jaeger Machine Co., 550 West Spring St., Columbus 16, Ohio
Tractomotive Corp. Deerfield, Ill.

**LUBRICANTS (Industrial)**

Acheson Colloids Co., Port Huron, Mich.
Penola Oil Co., 14300 McNichols Rd., West, Detroit 35, Mich.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
United Oil Mfg. Co., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

**MACHINE KEYS**

Standard Horse Nail Corp., New Brighton, Pa.

**MAGNESIUM INGOTS**

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.

**MAGNET CONTROLLERS**

Electric Controller & Mfg. Co., 4500 Lee Rd., Cleveland 28, Ohio.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio

**MAGNETIC PARTICLE TESTING**

Magnaflux Corp., 7300 West Lawrence Ave., Chicago 31, Ill.

**MAGNETS**

Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Electric Controller & Mfg. Co., 4500 Lee Rd., Cleveland 28, Ohio.
Jaeger Machine Co., Columbus 16, Ohio.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

**MANGANESE (Briquets)**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Whitehead Metal Products 303 West 10th St., New York 6, N. Y.

**MATCHPLATE METAL**

Federated Metals Division of American Smleting and Refining Co., 120 Broadway, New York 5, N.Y.

**MATCHPLATES**

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140 St., Cleveland 11, Ohio.
Scientific Cast Products Corp., 1388-92 E. 40 St., Cleveland 3, O.

**MELTING POTS**

Acme Foundry Co., Detroit 16, Mich.

**METAL CLEANING—See BLAST CLEANING EQUIPMENT**

**METERS (Gas, Air, Water)**

Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.

**MIXERS (Core Wash)**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

**MIXERS (Core Wash) SAND PREPARATION EQUIPMENT**

**MOLD CONVEYORS — See CONVEYORS (Mold)**

**MOLD DRYERS**

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

**MOLD JACKETS**

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

**MOLD OVENS—See CORE and MOLD OVENS**

**MOLD SEAL COMPOUND**

Presstite Keystone Engineering Products Co., 39th & Chouteau, St. Louis, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**MOLD WASH—See CORE and MOLD WASH**

**MOLDING MACHINES**

Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
Eastern Clay Products Dept. International Minerals & Chemicals Corp., 20 North Wacker Drive, Chicago 6, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Johnston & Jennings Div., Pettibone-Mulliken Corp., 2424 No. Cicero Ave., Chicago 39, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3328 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Shallway International Corp., Palo Alto, Calif.
Sutter Products Co., Dearborn, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

**MOLDING SANDS—See SAND**

**MOLYBDENUM and COMPOUNDS**

Climax Molybdenum Co., 500 Fifth Ave., New York 36, N. Y.
Molybdenum Corporation of America, Pittsburgh 19, Pa.

**MONORAIL SYSTEMS—See CONVEYORS (Overhead Monorail)**

**MOTORS (Electric)**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Link-Belt Co., Prudential Plaza, Chicago, Ill.
Ohio Electric Mfg. Co., 5400 Dunham Rd., Maple Heights, Ohio.

**MULLERS—See SAND PREPARATION EQUIPMENT**

**NAILS (Chill)**

Crescent Brass & Pin Co., 5766 Trumbull Ave., Detroit, Mich.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Standard Horse Nail Corp., New Brighton, Pa.

**NICKEL**

International Nickel Co., Inc., 67 Wall St., New York City 5.
Whitehead Metal Products, 303 West 10th St., New York 6, N. Y.

**NITROGEN—See GAS**

**NOZZLES (Blasting)**

Alloy Metal Abrasives Co., 121 South Division St., Ann Arbor, Mich.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers, Inc., 606 W. Wisconsin Ave., Milwaukee 3, Wis.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Wheelabrator Corp., 505 S. Byrkit St., Mishawaka, Ind.

**OIL BURNERS—See BURNERS**

**OPEN HEARTH DOORS**

Wm. M. Bailey Co., Pittsburgh 16, Pa.

**OPTICAL PYROMETERS—See PYROMETERS**

**OVENS (Annealing and Heat Treating)—See FURNACES (Heat Treating and Annealing)**

**OVENS (Core)—See CORE and MOLD OVENS**

**OVENS (Enameling, Japanning)**

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio
Lanly Co., 750 Prospect Ave., Cleveland 15, Ohio.
Michigan Oven Co., 419 Brainard, Detroit 1, Mich.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.

**OVENS (Mold Drying)—See CORE and MOLD OVENS**

**OXYGEN—See GAS**

**PAINT (Corrosion & heat resistant)**

Speco Inc., 7308 Associate Ave., Cleveland, Ohio.

**PARTING COMPOUNDS**

Acheson Colloids Co., Port Huron, Mich.
Delta Oil Products Co., Milwaukee 9, Wis.
Dow Corning Corp., Midland, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Co., Erie, Pa.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**PATTERN COATINGS**

Acheson Colloids Co., Port Huron, Mich.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.

**PATTERN COMPOUND**

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

**PATTERN DRAW MACHINES**

The Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

**PATTERN LUMBER**

Aetna Plywood and Veneer Co., 1724 N. Elston Ave., Chicago 22, Ill.
Bigelow-Garvey Lumber Co., 325 West Huron, Chicago 10, Ill.
Dougherty Lumber Co., 12100 Euclid Ave., Cleveland 6, Ohio.

**PATTERN METAL**

Cerro de Pasco Copper Co., 300 Park Ave., New York 22, N. Y.
Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

**PATTERN PLATES—See PATTERNS and PATTERN PLATES (Wood, Metal)**

**PATTERN SHOP EQUIPMENT**

Chicago Wheel & Mfg. Co., 1101 W. Monroe, Chicago 7, Ill.
DoAll Co., Des Plaines, Ill.
Kurt Orban Co., 34 Exchange Place, Jersey City 3, N. J.
Oliver Machinery Company, Grand Rapids 2, Mich.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

**PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)**

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Anderson Pattern Inc., Muskegon Heights, Mich.
Automotive Pattern Co., 1884 John R. Street, Detroit 3, Michigan.
Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
City Pattern Foundry & Machine Co., 1165 Harper, Detroit 11, Mich.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Kish Industries, 1301 Turner, Lansing 6, Mich.
Pyle Pattern & Mfg. Co., 2636 Sanford St., Muskegon Heights, Mich.
S.P.O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Scientific Cast Products Corp., 1388-92 E. 40th St., Cleveland 3, O.

**PERMANENT MOLDS**

Centrifugal Casting Machine Co., Tulsa, Okla.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**PHOSPHOR COPPER**

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N.Y.

**PHOTOGRAPHIC EQUIPMENT**

Eastman Kodak Co., Rochester, N. Y.

**PIG CASTING MACHINES**

Wm. M. Bailey Co., Pittsburgh 16, Pa.

**PIG IRON**

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio
Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh 19, Pa.
Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio.
Woodward Iron Co., Woodward, Ala.

**PIG IRON (Silvery)**

Hanna Furnace Co., Ecorse, Detroit 29, Mich.
Pickands, Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Keokuk Electro Metals Co., 429 So. 4th St., Keokuk, Iowa.
Miller & Company, 332 S. Michigan Ave., Chicago 4, Ill.

**PINS (Flask)—See FLASK BUSHINGS, PINS and FITTINGS**

**PITCH**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS**

**PNEUMATIC TOOLS and CHISELS**

Aro Equipment Corp., Bryan, Ohio.
Chambersburg Engineering Co., Chambersburg, Pa.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, Ohio.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Joy Mfg. Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.
Schramm Inc., West Chester, Pa.
Thor Power Tool Co., Aurora, Ill.

**POURING DEVICES**

Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Industrial Equipment Co., Minster, Ohio.
Modern Equipment Co., Port Washington, Wis.
Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

**PRESSER BOARDS**

Adams Co., Dubuque, Iowa.
Christiansen Corp., 210 South Marion, Oak Park 1, Ill.

**PRESSURE RECORDERS**

Foxboro Company, Foxboro, Mass.

**PULLEYS (Magnetic)—See SEPARATORS (Magnetic)**

**PUMPS**

Gardner-Denver Co., Quincy, Ill.

**PUMPS (Dry, Vacuum)**

Allis-Chalmers Mfg. Co. Milwaukee 1, Wis.
Fuller Company, Catasauqua, Pa.
Kinney Mfg. Div. New York Air Brake Co., 3541 Washington St., Boston 30, Mass.

**PUSH-OFF MACHINES—See PATTERN DRAW MACHINES**

**PUTTY (Foundry)**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.

**PYROMETERS**

Foxboro Company, Foxboro, Mass.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

**RACKS (Core Ovens)**

Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.

**RADIOGRAPHY (Industrital)**

Eastman Kodak Co., Rochester, N. Y.
Metal & Thermit Corp., 100 East 42nd St., New York, N. Y.

**REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)**

Ajax Electrothermic Corp., Trenton, N. J.
Babcock & Wilcox Co., 161 42nd St., New York 17, N. Y.
Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, Ohio.
Campbell-Hausfeld Co., Harrison, O.
Carborundum Co., Niagara Falls, N. Y.
Carborundum Co., Perth Amboy, N. J.
Carpenter Brothers Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Cedar Heights Clay Co., Oak Hill, Ohio.
The Cleveland Quarries Co., Amherst, Ohio.
Durex Refractories Co., P.O. Box 147, Jackson, Ohio.
Eastern Clay Products Dept., International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago 6, Ill.
General Refractories Co., 1520 Locust St., Philadelphia 2, Pa.
Great Lakes Carbon Corp., 579 Fifth Ave., New York 36, N. Y.
A. P. Green Fire Brick Co., Mexico, Missouri.
Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.
Illinois Clay Products Co., Joliet, Ill.
Ironton Fire Brick Co., Ironton, O.
Johns-Manville, 22 East 40th St., New York 16, N. Y.
Laclede Christy Div., H. K. Porter Co. Inc., 2000 Hampton Ave., St. Louis 10, Mo.
Lindberg Engineering Co., Fisher Furnace Div., 2450 West Hubbard, Chicago 12, Ill.
Mexico Refractories Co., Mexico, Mo.
Mullite Refractories, Shelton, Conn.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
North American Refractories Co., National City Bank Bldg., Cleveland 14, Ohio.
Norton Co., Worcester 6, Mass.
Sayreville Clay Co., Sayreville, N. J.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Stroman Furnace & Engineering Co., Div. of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.
Chas. Taylor Sons Co., 710 Burns St., Cincinnati 4, Ohio.
Titanium Alloy Mfg. Div., National Lead Co., 111 Broadway, New York 6, N. Y.
United States Graphite Co., Saginaw, Mich.
Walsh Refractories, 101 Ferry St., St. Louis 7, Mo.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.
Zirconium Corp. of America, 33697 Aurora Rd., Solon, Ohio.

**REFRACTORY GUNS**

Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, Ohio.
Burgess-Sterbentz Corp., 3790 West 150th St., Cleveland 11, Ohio.
Durex Refractories Co., P.O. Box 147, Jackson, Ohio.
Eastern Clay Products Dept., International Minerals & Chemicals Corp., 20 N. Wacker Drive, Chicago 6, Ill.
Peterson Foundry Supply Co., 39th Place & Racine, Chicago, Ill.

**RESIN (Shell Mold)**

Acme Resin Corp., Forest Park, Ill.
The Borden Co., Thor Division, 350 Madison Ave., New York 17, N. Y.
Catalin Corp. of America, 1 Park Ave., New York 16, N. Y.
Durez Plastics Div. Hooker Electrochemical Co., 1011 Walck Rd., North Tonawanda, N. Y.
General Electric Co., Chemical Materials Dept., 1 Plastics Ave., Pittsfield, Mass.
B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Kish Industries, 1301 Turner, Lansing, 6, Mich.
Monsanto Chemical Co., Plastics Div., Springfield 2, Mass.
Plastics Engineering Co., 1607 Geele, Sheboyan, Wis.
Reichhold Chemical Co., 525 North Broadway, White Plains, N. Y.
Schenectady Resins, P. O. Box 1046, Schenectady, New York.

**RESPIRATORS**

American Optical Co., Southbridge, Mass.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Willson Products Inc., Reading, Pa.

**RIDDLES (Electric)**

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kans.

**RIDDLES (Hand)**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Great Western Mfg. Co., Leavenworth, Kansas.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

**RISER COMPOUNDS**

Asbury Graphite Mills, Inc., Asbury, N. J.
Foundry Services, Inc., 2000 Bruck St., Columbus, Ohio.
Pittsburgh Metals Purifying Co., 1352 Morvista St., Pittsburgh 12, Pa.
U. S. Graphite Co., Saginaw, Mich.

**ROD STRAIGHTENERS—See CORE ROD STRAIGHTENING and CUTTING MACHINERY**

**ROLLER-HEARTH FURNACES — See FURNACES (Heat Treating and Annealing)**

**RUBBER LINING MATERIAL (Abrasive Resisting)**

B. F. Goodrich Co., Akron 18, Ohio.
Pangborn Corp., Hagerstown, Md.

**SAFETY EQUIPMENT**

American Optical Co., Southbridge, Mass.
M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Chicago Eye Shield Co., 2300 West Warren, Chicago 12, Ill.
Industrial Gloves Co., Danville, Ill.
Pangborn Corp., Hagerstown, Md.
Sani-Mist, Inc., 1724 Chestnut St., Philadelphia 3, Pa.
United States Rubber Co., 4300 New Haven Ave., Ft. Wayne 4, Ind.

**SALT and SALT TABLETS**

U. S. Safety Service Co., 1331 Oak St., Kansas City 6, Mo.

**SAND (Core, Molding, Blasting)**

Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Clayton Silica Co., Lafayette Bldg., Waterloo, Iowa.
Great Lakes Foundry Sand Co., United Artists Bldg., Detroit 26, Mich.
Nugent Sand Co., Muskegon, Mich.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.
Ottawa Silica Co., Ottawa, Ill.
Pangborn Corp., Hagerstown, Md.
Pennsylvania Glass Sand Corp., 140 Stanwix St., Pittsburgh 22, Pa.
Standard Silica Co., Ottawa, Ill.
Titanium Alloy Mfg. Div., National Lead Co., 111 Broadway, New York 6, N. Y.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**SAND BLAST BARRELS—See BLAST CLEANING EQUIPMENT**

**SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT**

**SAND BLAST NOZZLES—See NOZZLES (Blasting)**

**SAND BLAST ROOMS—See BLAST CLEANING EQUIPMENT**

**SAND BLAST TABLES—See BLAST CLEANING EQUIPMENT**

**SAND CONTROL and TESTING EQUIPMENT**

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Great Western Mfg. Co., Leavenworth, Kans.
Hayleo Controls Corp., Neenah, Wis.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

**SAND DRYERS**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.

**SANDING MACHINERY (Disc, Spindle, Belt, etc.)**

Cleco Division of Reed Roller Bit Co., Houston, Texas.

Oliver Machinery Company, Grand Rapids 2, Mich.

**SAND MEASURING and WEIGHING DEVICES**

Baker Perkins Inc., Saginaw, Mich.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

**SAND MIXERS—See SAND PREPARATION EQUIPMENT**

**SAND PREPARATION EQUIPMENT**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Champion Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, Ohio.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
B. F. Goodrich Co., Akron 18, Ohio.
Great Western Mfg. Co., Leavenworth, Kansas.
Hydro-Blast Corp., 10265 Franklin Ave., Franklin Park, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Link-Belt Company, Prudential Plaza, Chicago 1, Ill.
Monsanto Chemical Co., Plastics Division, Springfield 2, Mass.
Moulders Friend, Dallas City, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Pekay Machine & Engineering Co., 865 N. Sangamon St., Chicago 22, Ill.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.
States Engineering Corp., 922 W. Berry, Ft. Wayne 2, Ind.
Wheelabrator Corp., Mishawaka, Ind.

**SAND RAMMERS**

Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, O.
Master Pneumatic Tool Co., Inc., Orwell, Ohio.

**SAND RECLAIMERS**

Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Hydro-Blast Corp., 10265 Franklin Ave., Franklin Park, Ill.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

**SAND SIFTING and SCREENING MACHINERY—See SAND PREPARATION EQUIPMENT**

**SAND STORAGE BINS and GATES**

American Bridge Div. United States Steel Corp., 525 Wm. Penn Place, Pittsburgh 19, Pa.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Marietta Concrete Corp., Marietta, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Neff & Fry Co., Camden, Ohio.
Newaygo Engineering Co., Newaygo, Mich.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Webster Mfg. Co., Tiffin, Ohio.

**SAW SHARPENING SERVICE**

Hinckley Industries, Inc., Post Office Box 1100, Brunswick, Ohio.

**SAWS (Band, Metal, Wood)**

American Saw & Mfg. Co., Springfield, Mass.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N. Y.
DoAll Co., Des Plaines, Ill.
Hinckley Industries, Inc., Post Office Box 1100, Brunswick, Ohio.
Oliver Machinery Company, Grand Rapids 2, Mich.

**SCALING HAMMERS—See PNEUMATIC TOOLS and CHISELS**

**SCALES**

Toledo Scale Co., Toledo 1, Ohio.

**SCRAP (Iron and Steel)**

Luria Brothers, Lincoln-Liberty Bldg., Broad & Chestnut Sts., Philadelphia 7, Pa.

**SCREENS (Shakeout and Vibrating)**

Ajax Flexible Coupling Co., Westfield, N. Y.
Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Div. Pettibone Mulliken Corp. 2424 N. Cicero, Chicago 39, Ill.
Carrier Conveyor Corp., Frankfort Ave. at Clifton, Louisville 6, Ky.
Deister Concentrator Co., 901 Glasgow Ave., Ft. Wayne, Ind.
Great Western Mfg. Co., Leavenworth, Kansas.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Simplicity Engineering Co., Durand, Mich.

**SEA COAL**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Whitehead Bros. Co., 324 West 23rd St., New York 11, N. Y.

**SEPARATORS (Air, Moisture, Oil)**

American Air Filter Co., Louisville 8, Ky.
Jas. A. Murphy & Co., Hamilton, O.
C. A. Norgren Co., 3400 South Elati, Englewood, Calif.
Pangborn Corp., Hagerstown, Md.
A. Schrader's Son, 470 Vanderbilt Ave., Brooklyn 17, N. Y.
Wheelabrator Corp., Mishawaka, Ind.

**SEPARATORS (Magnetic)**

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee 7, Wis.
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee 46, Wis.

**SHAKE-OUT MACHINERY**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Air Filter Co., Louisville 8, Ky.
Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, O.
Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
The Branford Co., 130 Chestnut St., New Haven 7, Conn
Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, Ohio.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Planet Corp., 1820 Sunset, Lansing 6, Mich.
Robins Conveyors, Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.

**SHELL MOLDING (Equipment and Accessories)**

Beardsley & Piper Div., Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Carver Foundry Products, Muscatine, Iowa.
C & S Products Co., 12733 Fullerton Ave., Detroit 27, Mich.
Centrifugal Casting Machine Co., Tulsa, Okla.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
SPO Inc., 7500 Grand Division Ave., Cleveland 5, Ohio.
Shallway International Corp., Palo Alto, Calif.
Shell Process Inc., McKinstry Ave., Chicopee, Mass.
Sutter Products Co., Dearborn, Mich.

**SHELL MOLD SAND (Coated)**

Acme Resin Corp., Forest Park, Ill.

**SHELL MOLDS—See RESIN**

**SHOT AND GRIT**

Abrasive Shot and Grit Company, Springville, New York.
Alloy Metal Abrasive Co., 121 South Division St., Ann Arbor, Mich.
American Steel Abrasives Co., Galion, O.
Baldwin-Hill Co., 500 Breunig Ave., Trenton 2, N. J.
Carborundum Co., Niagara Falls, N. Y.
Carpenter Brothers, Inc., 606 West Wisconsin, Milwaukee 3, Wis.
Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Hickman-Williams & Co., Union Commerce Bldg., Cleveland 14, O.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Norton Co., Worcester 6, Mass.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh 1, Pa.
W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Steel Shot Producers, Inc., Butler, Pa.
Wheelabrator Corp., Mishawaka, Ind.

**SHOT (Peening)—See SHOT and GRIT**

**SHOVELS**

Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.

**SHOVELS (Power)**

Allen Industrial Products, Inc., P. O. Box 75, Battle Creek, Mich.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.

**SILICA FLOUR**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, O.
Ottawa Silica Co., Ottawa, Ill.
Pennsylvania Pulverizing Co., 140 Stanwix St., Pittsburgh 22, Pa.
Standard Silica Co., Ottawa, Ill.
Wedron Silica Co., 135 S. LaSalle St., Chicago 3, Ill.

**SILICOMANGANESE**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Pickands Mather & Co., Union Commerce Bldg., Cleveland 14, Ohio.
Vanadium Corp. of America 420 Lexington Ave., New York, N. Y.

**SILICON (Briquets)**

Electro Metallurgical Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro Alloys Corp., Canton 9, Ohio
Whitehead Metal Products, 303 West 10th St., New York 14, N. Y.

**SILICON CARBIDE (Briquets)**

Carborundum Co., Perth Amboy, N. J.
Ohio Ferro Alloys Corp., Canton 9, Ohio

**SILVERY PIG IRON—See PIG IRON (Silvery)**

**SKIMMERS**

Tamms Industries Inc., 228 North LaSalle St., Chicago 1, Ill.

**SLINGS (Chain)—See CHAIN**

**SLIP FLASKS—See FLASKS, slip**

**SLIP JACKETS—See MOLD JACKETS**

**SMELTERS and REFINERS**

Christiansen Corp., 210 South Marion, Oak Park 1, Ill.
Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.
Western Metal Co., 3201 So. Kedzie Ave., Chicago 23, Ill.

**SNAGGING MACHINES—See GRINDERS**

**SNAGGING WHEELS—See GRINDING WHEELS**

**SNAP FLASKS—See FLASKS (Snap)**

**SODA ASH**

Columbia-Southern Chemical Corp., Div., Pittsburgh Plate Glass Co., Pittsburgh 19, Pa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Olin Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Solvay Process Division, Allied Chemical & Dye Corp. 61 Broadway, New York 6, N. Y.

**SOLDER**

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

**SPECTROGRAPHIC ANALYSIS**

Baird Associates, 33 University Rd., Cambridge 38, Mass.
Spectrochemical Laboratories, Inc., P.O. Box 8781, Pittsburgh 20, Pa.

**SPRAY GUNS**

The Branford Co., 130 Chestnut St., New Haven 7, Conn.
Foundry Services, Inc., 2000 Bruck St., Columbus 7, Ohio
Murphy & Co., Jas. A., Hamilton, O.

**SPRUE CUTTERS**

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.
Rice Pump & Machine Co., Belgium, Wis.

**STEEL SHOT—See SHOT and GRIT**

**STEEL (Structural)**

American Bridge Co., Div., United States Steel Corp., 52 S. Wm. Penn Place, Pittsburgh 19, Pa.

**STRAINER CORES—See CORES (Strainer, Ceramic)**

**STRIPPING MACHINES—See PATTERN DRAW MACHINES**

**TANK TRAPS**

Jas. A. Murphy & Co., Hamilton, Ohio.

**TANKS (Dewatering)**

Claude B. Schneible Co., 212 Stephenson Bldg., P. O. Box 81, North End Station, Detroit 2, Mich.

**TELLURIUM**

American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.

**TEMPERATURE CONTROLLERS.**

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.

**TENSILE TESTING MACHINES**

Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.
Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines, Inc., 8817 Lyndon, Detroit 21, Mich.

**TESTING EQUIPMENT—See Type of Test**

**THERMOCOUPLES**

Claud S. Gordon Co., 3000 So. Wallace, Chicago 16, Ill.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 14, O.
Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

**TIMERS (Electric)**

Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.

**TIN**

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.

**TIRES (Industrial)**

Mitchell Industrial Tire Co., 1400 East 40th St., Chattanooga 7, Tenn.

**TONGS**

Industrial Equipment Co., Minster, O.

**TORCHES and BURNERS (Acetylene, Gas, Oil)**

Hauck Mfg. Co., 106 Tenth St., Brooklyn 15, N. Y.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.

**TORCHES (Gouging and Cutting)—See WELDING, CUTTING and GOUGING APPARATUS**

**TOTE BOXES—See BOXES (Stacking, Tote)**

**TRACTOR—See TRUCKS (Utility and Power Lift)**

**TRAMRAIL SYSTEMS—See CONVEYORS (Overhead Monorail)**

**TROLLEYS**

Curtis Pneumatic Machinery Div. Curtis Mfg. Co., 1905 Kienlen Ave., St. Louis 20, Mo.
Link-Belt Company, Prudential Plaza, Chicago 1, Ill.
Modern Equipment Co., Port Washington, Wis.

**TRUCK CRANES**

Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio
Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.

**TRUCKS (Core)**

Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.
Kirk & Blum Mfg. Co., 3108 Forrer St., Cincinnati 9, Ohio.
Prime Mover Co., Muscatine, Iowa
Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

**TRUCKS (Utility and Power Lift)**

Baker-Raulang Co., 1250 West 80th St., Cleveland 2, Ohio.
Buda Div., Allis Chalmers Mfg. Co., 1123 South 70th St., Milwaukee 14, Wis.
Clark Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio
Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Ill.
Hyster Co., 2902 N.E. Clackamas St., Portland 8, Oregon.
Jaeger Machine Co., Columbus 16, Ohio.
Kwik-Mix Co., 3026 West Concordia, Milwaukee 16, Wis.
Ready Power Co., 3826 Grand River Ave., Detroit 8, Mich.
Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.
Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.
Tractomotive Corp., Deerfield, Ill.

**TUMBLING BARRELS**

W. W. Sly Mfg. Co., 4753 Train Ave., Cleveland 2, Ohio.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**TUMBLING BARRELS (cleaning compounds)**

Almco Div. Queen Stove Works, Albert Lea, Minn.

**TURNTABLES**

Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill.
Modern Equipment Co., Port Washington, Wis.
Newaygo Engineering Co., Newaygo, Mich.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

**UNLOADERS (Car)**

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

**VACUUM DEGASSING EQUIPMENT**

Centrifugal Casting Machine Co., Tulsa, Okla.

**VALVES (Air, Oil, Water, Steam)**

Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio
Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.
North American Mfg. Co., 4455 E. 71st St., Cleveland 5, Ohio.
Numatics, Inc., Milford, Mich.

**VALVES (Blow-off and Cut-off)**

Champion Div. Pettibone Mulliken Corp., 2424 N. Cicero, Chicago 39, Ill.
Cleco Pneumatic Tool Div. Reed Roller Bit Co., Houston, Texas.
C. B. Hunt & Sons Inc., Salem, Ohio.

**VALVES (Oxygen, Acetylene)**

Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**VENTILATING — See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS**

**VENTS (Corebox)**

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Demmler, Wm. & Bros., Kewanee, Ill.
C. M. Smillie & Co., 1124 Woodward Hgts. Blvd., Ferndale 20, Mich.

**VIBRATORS**

Adams Co., Dubuque, Iowa.
Beardsley & Piper Div. Pettibone Mulliken Corp., 2424 No. Cicero, Chicago 39, Ill
The Branford Co., 130 Chestnut St., New Haven 7, Conn.
Burgess-Sterbentz Corp., 3790 West 150th St., Cleveland 11, Ohio.
Chicago Pneumatic Tool Co., 6. E. 44th St., New York 17, N. Y.
Cleveland Vibrator Co., 2828 Clinton Ave., W., Cleveland 13, Ohio.
Davenport Machine & Foundry Co., Davenport, Iowa.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Link-Belt Co., Prudential Plaza, Chicago 1, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
S P O Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.
Tabor Mfg. Co., Div. Turbo Machine Co., Lansdale, Pa.

**VISES (Hydraulic, Mechanical, etc.)**

Desmond-Stephan Mfg. Co., Urbana, Ohio.

**WASHES—See CORE and MOLD WASH**

**WEDGES (Foundry)**

The Adams Co., Dubuque, Iowa.

**WELDING APPARATUS (Electric Arc, Inert Gas)**

Air Reduction Sales Co., 60 East 42nd St., New York 17, N Y
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**WELDING, CUTTING and GOUGING APPARATUS and SUPPLIES**

Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Liquid Carbonic Corp., 3110 S. Kedzie Ave., Chicago 23, Ill.
Wilson Welding Co., 221 High St., Altizer Addition, Huntington, West Va.

**WELDING ELECTRODES (Carbon)**

Becker Bros. Carbon Co., 3450 South Laramie, Cicero, Ill.
National Carbon Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
United States Graphite Co., Saginaw, Mich.

**WELDING GAS—See GAS**

**WELDING RODS and ELECTRODES**

Air Reduction Sales Co., 60 East 42nd St., New York 17 N. Y.
Carborundum Co., Perth Amboy, N. J.
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Linde Air Products Co., Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

**WHEELBARROWS**

Sterling Wheelbarrow Co., 7100 W. Walker St., Milwaukee 14, Wis.

**WHEELS (Abrasive Contact)**

Chicago Rubber Co., 2620 North Clybourn, Chicago 14, Ill.

**WHEELS (Wire Brush)**

Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

**WIRE CUTTERS**

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio

**WIRE NAILS**

Republic Steel Corp., 3100 E. 75th St., Cleveland 27, Ohio.

**WIRE ROPE**

American Chain & Cable Co., Inc., 271 South Pennsylvania Ave., Wilkes-Barre, Pa.

**WOODWORKING MACHINERY**

DoAll Company, Des Plaines, Ill.
Oliver Machinery Co., Grand Rapids 2, Mich.

**X-RAY EQUIPMENT**

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
High Voltage Engineering Corp., 7 University Rd., Cambridge 38, Mass.
Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

**X-RAY FILM and ACCESSORIES**

Eastman Kodak Co., Rochester, N. Y.
Picker X-Ray Corp., 25 S. Broadway, White Plains, N. Y.

**ZINC**

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Henning Bros. & Smith Inc., 91 Scott Ave., Brooklyn, N. Y.
George Sall Metals Co., 2300 East Butler St., Philadelphia 37, Pa.

**ZIRCON SAND**

M. A. Bell Co., 217 Lombard St., St. Louis 2, Mo.
Berkshire Chemicals, Inc., 420 Lexington Ave., New York 17, N. Y.
Carpenter Brothers, Inc., 606 West Wisconsin Ave., Milwaukee 3, Wis.
Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.

# Dear Reader:

The magic number is 1521 .....

That's where all of us (the FOUNDRY gang) will be on deck to greet you at the Atlantic City AFS Convention and Exhibit.

We cordially invite you to visit us at Booth 1521 --- here you may relax in comfortable chairs and sofas --- peruse a copy of FOUNDRY --- inspect our sister Penton Publications (STEEL, NEW EQUIPMENT DIGEST, MACHINE DESIGN, AUTOMATION) --- pick up some matches and notebooks --- meet the editors and the business staff --- it will be real nice to see you in person!

Look for your
JUNE POST-CONVENTION ISSUE

..... a complete report on the show and most technical sessions will be a feature of next month's issue of FOUNDRY.

If you are reading this copy as a "passalong reader", why not obey that impulse to treat yourself to a personal subscription? Elsewhere in this issue is a handy airmail postal card which we invite you to use to start copies coming to you direct.

* * *

For further information --- are you taking advantage of our new service? Now you may mail in a request for literature and further information on all products and equipment described in each issue of FOUNDRY. Look for the special insert and handy Reader Service Cards in this issue.

FOUNDRY

# GLUTRIN
## LIQUID BINDER

# GOULAC
## DRY BINDER

*For*
*CORE WORK, SAND FACINGS, SPRAYS*

**Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers**

**Robeson Process Company**
(Established 1905)

**American Gum Products Co.**
(Established 1915)

GENERAL OFFICES: 500 FIFTH AVENUE • NEW YORK 18, N. Y.


# CLASSIFIED ADVERTISING

## Help Wanted

**METALLURGIST—PLUS**

Age 32 to 50, graduate Engineer, must have extensive experience in low carbon and stainless steel and capable of directing melter. Knowledge of sand control, gating, risering, molding, core making and general foundry operations helpful. Preference given to man with executive leanings and opportunity of becoming Assistant Manager or Manager. A wonderful opportunity for a live wire who is capable and willing to give freely of his utmost.

Location Massachusetts, job shop, 1 to 20,000 lb. castings, iron, bronze, alloy steel, 130 men. In reply enclose photograph and full particulars including approximate salary required. Your record must be as clean as a hound's tooth. We want a good man in the fullest sense of the word.

**BOX 948, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**HELP WANTED**

General Maintenance Foreman. Mechanical or Electrical Engineering background preferred. To head maintenance department of a leading steel foundry in east. Should be well versed in present day managerial problems and abreast of all phases of foundry and plant maintenance engineering. Job challenge, excellent pay, job security, good working conditions, promising future are available for the man who qualifies. For details, write in confidence to:

**BOX 924, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

## Help Wanted

**SALES MANAGER**

Familiar with stainless steel and high temperature alloys. Technical background preferred. Location western Michigan.

**GEORGE & DIX**
**Management Consultants**
**FEDERAL SQUARE BUILDING**
**GRAND RAPIDS, MICHIGAN**

**SERVICE ENGINEER WANTED**

Young man, with foundry sand experience, college education, and native intelligence has a real opportunity with growing, aggressive supply company if he is sales minded and is willing to travel, learn and work. Send complete record, photograph and salary requirements.

**BOX 950, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**PLANT ENGINEER**

With some production experience desirable for industrial sand producer.

**NUGENT SAND CO.**
**P.O. BOX 506 MUSKEGON, MICHIGAN**

## Help Wanted

**METALLURGIST**

Expanding, progressive, integrated steel mill located near St. Louis, Missouri, has opening for metallurgist or metallurgical engineer. Should have minimum of 3 to 5 years foundry experience. To exercise quality and supervisory control over foundry producing molds and stools and other castings for in-plant use. This is a new department and the position offers outstanding opportunities for personal and professional growth. Salary open. Please submit resume including education, experience, and salary requirements.

**SUPERINTENDENT OF PERSONNEL**
**GRANITE CITY STEEL COMPANY**
**GRANITE CITY, ILLINOIS**

**TIME AND MOTION SUPERVISOR**

YOUNG MARRIED MAN WITH COLLEGE TRAINING AND SOME EXPERIENCE IN TIME, MOTION, AND METHOD STUDY PREFERABLY IN A STEEL FOUNDRY. MUST BE QUALIFIED TO DEVELOP AND CARRY ON THE VARIED DUTIES AS NECESSARY. EXCELLENT WORKING CONDITIONS. VARIOUS EMPLOYMENT BENEFITS.

**BOX 994, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**FOUNDRY SUPERINTENDENT**

Excellent opportunity in medium-sized iron, brass and aluminum foundry located in the southeast. Require superintendent with thorough knowledge of machine and floor molding, gating, sand control, both jobbing and production work. Applicant must know all phases of foundry work and be capable of producing pressure-tight and porous-free castings economically. Send full resume, picture, age, and salary expected. Address: Box 982, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# CLASSIFIED ADVERTISING

## Help Wanted

Help Wanted

### EXCELLENT OPPORTUNITY

**Supervisor For Investment Casting Operation**

Here's an exceptional opportunity in a permanent key position with one of the country's leading manufacturers of electronic components and jet aircraft accessories.

The man we're looking for has had comprehensive experience in precision plaster and investment casting procedures for nonferrous metals (aluminum, magnesium and brass). He will have the ability and desire to supervise and he will be ambitious enough to work towards greater responsibilities. Chances are a man under 30 would not have the necessary experience, nor is it likely that a man over 50 would want to make a change.

If you're our man, then you can look forward to working with friendly associates in a company that offers generous benefits, and opportunity for executive advancement.

We are located in metropolitan New Jersey (just 30 minutes away from New York City). Salary will match both your experience as well as the responsibilities entrusted to you.

Please tell us ALL about yourself in your letter. Adress: Box 975, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### QUALITY CONTROL SUPERVISOR

QUALIFIED TO HANDLE TECHNICAL OPERATIONS IN A STEEL FOUNDRY. SOME METALLURGICAL BACKGROUND, RESPONSIBLE FOR VARIED TECHNICAL PHASES. MUST UNDERSTAND INSPECTION AND TESTING METHODS AND HAVE SOME KNOWLEDGE OF HEAT TREATING. SHOULD BE FAMILIAR WITH GATING, RISERING, CASTING DESIGN, RAW MATERIALS, SPECIFICATIONS, AND CASTING DEFECT ANALYSIS. MUST BE ABLE TO SET UP STATISTICAL CONTROLS AND CONDUCT RESEARCH EXPERIMENTS.

**BOX 995, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

### FOREMAN

**Precision Castings—Lost Wax Process**

Experienced in wax patternmaking, investing, and pouring of metals. Excellent future with expanding company. Salary plus employee benefits. Send resume or reply to—

**BOX 972, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

### WANTED

Man qualified to assume full responsibility for quality control functions in medium size, malleable iron foundry located in the East.

**BOX 965, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

### DESIGNERS-DRAFTSMEN-ENGINEERS

Experienced in foundry layouts and equipment. Send experience record, personal data, recent photo and references prior to personal interview.

**BOX 943, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

### WANTED

A company located in the east producing carbon, low alloy and high alloy castings desires a man to take charge of quality control. Applicant should have 10 to 15 years' experience and have thorough knowledge of heading and gating, pattern requirements, and highest quality standards. He must be familiar with all productive departments, such as molding, core cleaning and melting. A fair technical training would be required. Address: Box 934, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### WANTED

Large steel foundry organization interested in men in thirties and early forties, preferably with pattern background and wide experience in developing and checking molding and core practices. Write stating full particulars to:

**BOX 919, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

### FOUNDRY CHIEF DRAFTSMAN

For design of foundry sand handling and preparation systems.

**BOX 962, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

### FOUNDRY METALLURGIST

Development and service work involving moderate travel for large corporation producing wide variety of melting materials. Must have sound metallurgical education and wide knowledge of iron and steel foundry technology. Location, middle west. Address: Box 992, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### FOUNDRY SERVICE ENGINEER

For progressive research organization in gray iron castings field. Must have engineering training and at least five years' practical foundry experience. Must be willing to travel and be interested in application of results of research work to plant practice. Salary commensurate with ability. In replying give educational background, foundry experience, and brief biographical sketch. Address: Box 941, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### METALLURGIST

Technically trained with malleable experience for well established progressive, jobbing and semi-production foundry in middlewest employing 150 men. Capable of supervising batch type air furnace melting, annealing and laboratories. Submit application including personal data, resume of qualifications and experience, references and salary expected. Address: Box 979, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### NONFERROUS FOUNDRY FOREMAN

Medium-size aluminum foundry near Cleveland, specializing in medium and large jobbing work. Must know all phases of foundry operations and aluminum alloys. In reply give age, experience, references and include photograph. Address: Box 926, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Help Wanted

### FOUNDRY SUPERINTENDENT

For medium-sized gray iron foundry in Midwest specializing in floor work. Must have experience in floor molding and production methods including sand slinger operation. Preferred age 35-45 years. Send personal description, experience, work history, references, and photograph. Address: Box 970, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### FOUNDRY ENGINEER

Challenging position in management engineering for young foundry engineer prepared to travel. Must know gray iron foundry operations, able to make layout drawings. Industrial engineering experience desirable. Reply with photo and state age and salary required. Address: Box 959, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### CLEANING ROOM FOREMAN

Most modern and progressive steel foundry in the middle west. Advise full particulars. Address: SWEDISH CRUCIBLE STEEL CO., 8561 BUTLER AVE., DETROIT 11, MICHIGAN.

### NONFERROUS FOUNDRY

Needs superintendent to improve operations so that pressure tight bronze castings and aircraft quality aluminum castings are consistently and economically produced. Attractive opportunity in Northern Ohio. Address: Box 933, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### SALES ENGINEER

Well established southeast foundry offers excellent opportunity to aggressive Sales Engineer in foundry and structural steel. Send full qualifications in first letter. Address: Box 967C, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Positions Wanted

### MANAGER OR SUPERINTENDENT

Thirty-five years' practical experience in foundry, molder eighteen years. Have been foreman, superintendent and general manager. Did consultation work in various foundries. One was losing $7,000 per month when I started, in seven months it was making good money. Ran three largest foundries in St. Louis, largest one in Chicago. Understand gray iron, semi-steel, brass, aluminum. Know how to rig jobs to get best production at lowest cost. Understand running of cupola mix of various metals; estimating jobs from blueprints. Can give best of references. Available immediately. Address: Box 996, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### CORE ROOM FOREMAN

Sixteen years in coreroom supervision, steel and gray iron. Experienced in all types of coremaking. Rig boxes for blowers. Very good on production and handling personnel. Address: Box 940, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### FOUNDRY SUPERINTENDENT

With thorough knowledge of all phases of ferrous and nonferrous metals. Understand gating, jobbing, floor, machine. Know sand control and core work. Will relocate. Age 42. Married. Address: Box 989, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### MELTING SUPERINTENDENT—STEEL

Electric and open hearth. Basic and acid practice. Sixteen years' superintendent experience. Thorough knowledge of alloy and carbon steels. Address: Box 946, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

### GENERAL FOUNDRY FOREMAN

Seventeen years' foundry supervision experience, capable of handling small or large forces. Cost conscious, high production rate in either iron, brass or steel. Will relocate. Address: Box 922, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

# CLASSIFIED ADVERTISING

## Positions Wanted

**TOP EXECUTIVE**

Offers 27 years of most extensive experience in all phases of steel foundry operations, plant engineering and maintenance. Whatever the problem in foundry engineering or management, it has been worked upon. A graduate registered mechanical engineer. Age 50. At present employment for 13 years. Desire change for good reason. If there is a tired President or General Manager who needs a right hand, write in confidence to:

**BOX 939, FOUNDRY**

**PENTON BLDG. CLEVELAND 13, OHIO**

**EXECUTIVE**

Experience in all phases of foundry operations and management. Thorough knowledge of machine shop, pattern shop, engineering, metallurgy, foundry cost and estimating, sales and industrial relations. Registered mechanical engineer, 25 years' experience foreman, superintendent, general manager and vice president. Foundry running 150 tons daily. Address: Box 977, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY EXECUTIVE AND METALLURGICAL ENGINEER**

Presently managing gray iron foundry seeking new affiliation with progressive gray iron or malleable foundry or sales organization. Experience in management, technical, sales and operational phases of gray iron and malleable. Age 34. Address: Box 987, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**MANAGER OR SUPERINTENDENT**

Twenty-five years of practical and technical foundry experience in ferrous and nonferrous metals. Light and heavy jobbing and production foundries. Manager and superintendent for the past eighteen years. Cost minded. Good trouble shooter, with best of labor relations. Age 45. Now employed. Address: Box 935, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**PERMANENT MOLD FOREMAN**

Graduate metallurgist experienced in design, estimating, operation. Over 20 years in nonferrous castings, including sand, shell and die casting. Address: Box 984, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**GRAY IRON SUPERINTENDENT OR MANAGER**

Age 44, prefer location in west or southwest, 21 years' supervisory, last ten as superintendent, college graduate. All phases, including cost and time study. Resume on request. Address: Box 980, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**MOLDING FOREMAN**

Desire position in gray iron production. Thirty-four years' experience automotive, agricultural, marine, diesel, valve, plumbing, etc. Age 50, quality castings, low scrap. Can reduce costs. Address: Box 988, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**ARE YOU STILL**

looking for that young foundryman with an engineering degree and with years of practical experience from modern jobbing and production gray iron shops? The future minded foundry manager will find the solution to his problem by answering this ad!—Aggressive and hardworking and can think ahead. Journeyman. Now employed in supervisory capacity. Desire position with advancement opportunity with progressive organization. Go anywhere. Address: Box 983, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY SUPERINTENDENT**

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumbers supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 976, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Positions Wanted

**COREROOM FOREMAN**

Desire position as working foreman or assistant. Forty-one years old, 22 years' experience in nonferrous jobbing and production shops. Day work or incentive. Some knowedge of cost and molding practice. Three years in charge of coreroom. Wish to relocate in upper middle west or west. Would like position where I can increase my knowledge and further my training for advancement. Address: Box 981, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY SUPERINTENDENT**

With experience in ferrous and nonferrous foundries, desire sales in foundry supply or equipment. Address: Box 990, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**WORKS MANAGER-SUPERINTENDENT**

Capable of operating a 350 man organization, 23 years of experience in casting ferrous and nonferrous metals in sand, permanent and investment molds profitably. Address: Box 953 FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**PATTERN SHOP FOREMAN AND CASTING BUYER**

Desire position either as pattern foreman and estimator or as pattern engineer and casting buyer. Like to travel, prefer position in West or far Midwest. Address: Box 923, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**GENERAL FOREMAN**

Cleaning room. Experienced in all phases of cleaning room operations. Wish to relocate. Will furnish all information requested. Address: Box 973, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOREMAN**

Gray iron or malleable. Twenty-five years' foundry experience. Fourteen years' supervisory. Presently employed. Address: Box 961, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**INDUSTRIAL ENGINEER OR TECHNICAL SUPERINTENDENT**

Years of experience in all types of foundries. Will reduce cost, with methods improvements. Want connection with good active foundry. Address: Box 960, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOREMAN OR SUPERINTENDENT**

Thirty-three years' practical experience, 20 years as supervisor in both jobbing and high production shops. Experienced in rigging and gating for fast production and quality castings, both gray iron and nonferrous metals. Address: Box 966, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**SUPERINTENDENT OR GENERAL FOREMAN**

Gray iron or nonferrous. Prefer small to medium shop, jobbing or production. Practical man, thirty years' experience, molder, foreman, superintendent. Well versed all departments. Available immediately. Address: Box 978, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**FOUNDRY SALES OR SERVICE POSITION**

Five years' experience in general foundry operation. At present general foreman in production foundry. College degree in Economics. Have public contact experience. Looking for a greater opportunity. Address: Box 964, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**WORKS MANAGER—SUPERINTENDENT**

University education, 21 years' experience in plain and alloy gray irons, carbon, low and high alloy steel. Castings from ½ lb. to 15 tons, know electric arc, induction, open hearth furnace and cupola operation. Have been metallurgist and chemist, superintendent, works manager, general manager, vice president, foundry consultant. Will relocate. Age 46, married. Address: Box 951, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Representative Available

**MANUFACTURERS' REPRESENTATIVE**

Desire additional lines on commission basis. Presently selling leading line of shot and grit, in western, central and southern Ohio. Address: Box 974, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Representatives Wanted

**DISTRIBUTORS OR SALES REPRESENTATIVES**

Manufacturer expanding sales effort into all Foundry centers in U. S. and Canada. We seek aggressive and experienced sales organization to contact prospects and introduce our long established nationally advertised line of products to all foundries and all patternshops in your area. Many leads provided from direct mail campaigns. Excellent profit and repeat business. Producer will assist in expanding established market. Please give detailed information on territory covered, number of salesmen, warehouse facilities, if any, and other lines handled in first letter. Address: Box 968, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**SALES REPRESENTATIVES**

Through our advertising in FOUNDRY and other trade magazines, we are receiving inquiries for our strainer cores, pouring pipes and other ceramic specialties. We require experienced sales representatives to contact these interested prospects and introduce our line of products to all foundries in several good territories. Please give detailed information about yourself and other lines handled in first letter. Address: MR. C. L. EVANS, UNIVERSAL CLAY PRODUCTS CO., SANDUSKY, OHIO.

**REPRESENTATIVES**

To sell Pressure Cast Matchplates. Will give exclusive territory. Address: Box 930, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**METALS, MINERALS, CHEMICALS**

Salesman with industrial clientele, wanted on HIGH COMMISSION. Write complete personal and sales data in confidence. Include photo. BRAM CHEMICAL CO., 820 - 65th AVE., PHILADELPHIA 26, PENNSYLVANIA.

## Foundry Consultant

**HAROLD J. ROAST, FIM, FCS**

BRONZE FOUNDRY CONSULTANT

50 YEARS' EXPERIENCE

AVAILABLE COAST TO COAST

**140 GROSVENOR AVENUE**

**OTTAWA, ONTARIO, CANADA**

**ELECTRIC FURNACE CONSULTANT BASIC AND ACID PRACTICE**

Supervisor on electric furnaces for 35 years. Thorough knowledge of:

1. All kinds of plain carbon and alloy steel.
2. Analysis control.
3. High standard of physical properties.
4. Low Cost with high productivity.

**EUGENE H. WEAK 2933 HIGHWAY AVE.**
**HIGHLAND, IND. PHONE: TEMPLE 8-1244**

## Accounts Wanted

**ACCOUNTS WANTED**

Established equipment and supply company, State of Wisconsin, desire additional lines. Engineering background, interested in heavy equipment, etc. Address: Box 971, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## Opportunity

**PERMANENT MOLD METHOD AVAILABLE**

**THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California,** has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

# CLASSIFIED ADVERTISING

## Employment Service

**FOUNDRY PERSONNEL SPECIALISTS**

National Placement and Procurement of

**GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.**

Confidential Inquiries Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

**DRAKE PERSONNEL, INC.** **HARRISON 7-8600**
**JOHN COPE, DIRECTOR** **220 SOUTH STATE ST., CHICAGO, ILL.**

**SALARIED PERSONNEL**

$5000-$30,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, P. O. BOX 674, MANCHESTER, VERMONT.

## Wanted-To-Buy

**WANTED TO BUY**

B&P Sand Preparator.
Roger Model S-5222-11 M Sand Preparator.
Aerator for No. 2 Simpson muller.
Dust cover for No. 2 Simpson muller.
In reply state price, condition, location.

**BOX 963, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**WANTED TO BUY**

66"-72" Cupola with or without blower or charger. Must be late model and in good condition.

**MEECH FOUNDRY, INC.**
**9906 MEECH AVENUE CLEVELAND 5, OHIO**

**WANTED TO BUY**

**Used Crane Runway**

Runway, rails and supporting A frames for 15 ton bridge crane. Span 56 ft. 11 inches x 240 of travel. Foundation to top of rails 40 ft., crane wheel loads 30,500 # on 11 ft. 9 inch wheel base.

**BOX 949, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**MIXERS WANTED**

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**WANTED TO BUY**

One high frequency induction furnace—30 to 50 lb. steel capacity. Address: Box 985, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**WANTED**

Small shell molding, permanent mold or die casting foundry. Willing to purchase full or part interest. Address: Box 986, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

**WANTED**

Used Handy Sandy. Address: LA PORTE FOUNDRY COMPANY, LA PORTE, INDIANA.

## Pattern Shop For Sale

**FOR SALE**

Wood and metal pattern shop, completely equipped, ready to operate, good supply seasoned pattern lumber. Long lease available. Address: MRS. A. L. SEWARD, SEWARD PATTERN WORKS, 501 WALBRIDGE STREET, KALAMAZOO, MICHIGAN.

## Foundries For Sale

**FOR SALE**
**Land and Buildings**
**of**
**THREE RIVERS CASTING CO.**
**Three Rivers, Michigan**
**BARGAIN AT $55,000.00**

Brick and concrete block and steel construction, concrete floors; 28,000 square feet. Served by New York Central RR and Michigan Central RR. Lloyd-Thomas Appraisal $175,000.00 plus land. Oil fired boiler; overhead heating units; sprinkler. With or without foundry equipment. Immediate possession. Complete details upon request.

**BOX 937, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**FOR SALE**

**Brass and Aluminum Foundry-Established 1916**
Splendid opportunity for young man with desire to live in Florida.
Jobbing Foundry: Bronze Tablets, Name Plates, etc.
Reason for selling: Retiring.
Price $30,000.00

**P.O. BOX 871**
**TAMPA, FLORIDA**
**PHONE: 22109**

**FOUNDRY FOR SALE**

**Small iron foundry fully equipped, with railroad siding, ready to operate. Location: Lincoln, Nebraska. Building and real estate go with business. Sale necessary to settle estate. Address: JOSEPH J. CARIOTTO, FEDERAL SECURITIES BUILDING, LINCOLN, NEBRASKA.**

**FOUNDRY FOR SALE**

Brass foundry and machine shop, manufacturing marine hardware, propellers and fire fighting equipment in Vancouver, Canada. Good opportunity of securing a going business. Address: Box 969, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

## For Sale

**FOUNDRY EQUIPMENT**

16—Pot-type Aluminum Holding Furnaces. 600 Cap. Shell 48" dia. x 35⅜" Hi. with McKee burners.

Grinder, pedestal type, dbl. end 12" wheel, model 102 Cincinnati w/2 hp motor less stand. serial No. 75055.

Furnace, heat treat elec. vert. type, temp. 1000°, 12 ft. lift, 120 KW max, load 1000 #.

Dust Collector, wet type 500 CFM "Uni-Wash" Spencer-Turbo Compressor blower 550 CFM 20 oz. 220 volt motor, 3 hp.

Spencer-Turbo Compressor blower 150 CFM 24 oz., 220 volt, 2 hp motor.

Spencer-Turbo Compressor blower 85 CFM 20 oz. lot 15802, 220 volt, serial No. 18017.

**BOHN ALUMINUM & BRASS CORP.**
**1400 LAFAYETTE BLDG.**
**DETROIT, MICH.**

## For Sale

**FOR SALE**

1—Shot Blast 36" Cleaning Barrel Machine 1953 with Dust Collector—like new .....$1500
Link Belt Company V Flexmont Oscillating Conveyor 50' x 12" .....$450.00
2—Tabor Roll Overs 14 x 20 and 36 x 20..... ..... $75.00 ea.
120 ft Double Track Westover Conveyor 24" High. 45 metal pallets 18 x 72 3 bar all as new 65% of new price
1—4000 gal. oil tank 5/16 thick, excellent condition .....$300.00
3—Whiting Pourite Ladles 250# with modern handles .....$100.00 each
1—Two Ton Rotary Oil Furnace for iron and steel 75 minutes per ton guaranteed..$5000.00
16 ft Handy Handler belt conveyor with motor .....$135.00

**BAMBER FOUNDRY, INC.**
**507 CANAL STREET**
**STAMFORD, CONN.**

**FOR SALE**

Heller Universal Cold Saw complete with motor, control, table. Includes Heller Saw Sharpener and a lot of 26" and 28" saws. Machine capacity up to 8½" round stock. In excellent condition. Priced to move from storage quickly. Write for price and details.

**BOX 925, FOUNDRY**
**PENTON BLDG. CLEVELAND 13, OHIO**

**FOR SALE**

**TURBO BLOWERS WITH MOTORS**

| CFM | PRESS. | MAKE | CFM | PRESS. | MAKE |
|---|---|---|---|---|---|
| 8375 | 20oz. | Spencer | | | |
| 6000 | 32oz. | Ing.-Rand | 340 | 20oz. | A-B |
| 4700 | 32oz. | Ing.-Rand | 320 | 12oz. | Spencer |
| 2500 | 7oz. | Sturt. | 250 | 12oz. | No. Am. |
| 1300 | 16oz. | Spencer | 9000 | 6"SP | Northern |
| 800 | 13oz. | Buffalo | 3420 | 8"SP | N.Y. |
| 500 | 12oz. | Buffalo | 2700 | ⅝"SP | Ilg |
| 450 | 7oz. | Spencer | 2500 | ½"SP | American |
| 400 | 16oz. | No. Am. | 1100 | 4½"SP | Bayley |
| 380 | 16oz. | No. Am. | 2344 | 2"SP | Clarage |

**THE MOTOR REPAIR & MFG. CO.**
**1552 HAMILTON AVE.**
**CLEVELAND 14, OHIO**

**FOR SALE**

Foxboro air weight controller, model 10, type 113, serial No. 887871.
Jeffrey Vibrating Feeder, type 3, serial No. 20449, size 12" x 10'5", with rectifier.
Jaeger mobile crane, 18' boom, solid tires. 5 ton capacity.

**MEECH FOUNDRY**
**9906 MEECH AVENUE**
**CLEVELAND, OHIO**
**TELE: MICHIGAN 1-5550**

**FOR SALE**

Roots - Connersville positive pressure cupola blower with 440 volt motor and magnetic control. Complete with Foxboro volume control, piping, pulsation snubbers and air filters. An up-to-date outfit for a cupola lined to 60" diameter or less. Inquire.

**THE BOWLER FOUNDRY COMPANY**
**1050 UNION COMMERCE BLDG.**
**CLEVELAND 14, OHIO**
**PHONE: PR 1-2345**

# CLASSIFIED ADVERTISING

## For Sale

**WE PROUDLY ANNOUNCE THE OPENING OF OUR NEW OFFICE AND WAREHOUSE IN LARGER QUARTERS TO SERVE YOU BETTER**

OPENING SPECIAL

Osborn Power Rollovers—Model 2047-4; Cap. 18" x 24"; stationary; 1942 machines. These machines cost the government $4,000.00 They are in excellent condition. As an opening special we offer them for $250.00 each.

JOLT ROLLOVER MOLDING MACHINES

| | |
|---|---|
| #918 Johnston & Jennings—44" x 54"; 18" draw; no pit required | $1250.00 |
| International—Type F; 31" x 12" | 350.00 |
| #601 Osborn; 750 lb. cap.; 30" flask | 350.00 |
| #602 Osborn; 750 lb. cap; 36" flask | 450.00 |
| #605 Osborn; 750 lb. cap; 54" flask | 650.00 |
| Tabor 30" x 40"; extends to 69"; 12" draw, shockless type; 1500 lb cap. | 950.00 |

JOLT STRIP MOLDING MACHINE

| | |
|---|---|
| #559 Osborn—25 x 30; 1200 lb. cap. | 550.00 |

JOLT SQUEEZE STRIP MOLDING MACHINES

| | |
|---|---|
| #143 Milwaukee | 350.00 |
| #163 Milwaukee | 450.00 |
| #183 Milwaukee | 550.00 |
| Nichols—Type B; 14" cyl. 14" x 36" | 250.00 |
| #211 SPO | 550.00 |
| #213 SPO—19 x 26; 4½" jolt cyl.; 13" sq. | 750.00 |
| #2114 SPO—14 x 24; 11" sq. cyl. | 650.00 |
| #2136 SPO—13" sq. cyl. | 750.00 |
| #720 PJ Osborn—31 x 44; 11" sq. cyl. | 550.00 |

JOLT SQUEEZERS

| | |
|---|---|
| Nicholls—Type D | 250.00 |
| Osborn—#275 J 16 x 20; 10" sq. cyl. | 275.00 |
| Osborn—#276 J | 350.00 |

PUSH OFF MACHINES

| | |
|---|---|
| Champion—Model LLA-45; 45 x 26" used with sandslinger | 350.00 |
| International; Model LP-Portable Pin Lift; 30 x 40 used with sandslinger | 350.00 |

Core Blowers—Core Rollovers

| | |
|---|---|
| #193 Osborn—for med. cores | 650.00 |
| #94 Osborn—for large cores | 750.00 |
| Osborn Hand Rollovers—Model 42 | 100.00 |

MATERIAL HANDLING EQUIPMENT

| | |
|---|---|
| Model HA Hough Payloader | 1000.00 |
| Clark Fork Lift Truck—6000 lb | 1000.00 |
| Elwell Parker Fork Lift Truck—4000 lb | 1000.00 |
| Mercury Fork Lift Truck—2000 lb. Elec. | 1000.00 |
| Lewis-Shepard Platform Lift Trucks | 150.00 |

FURNACES

| | |
|---|---|
| Stroman—2000 lb. Tilting Hydraulic | 1500.00 |

CORE OVENS

| | |
|---|---|
| Dielectric—Model 900A and 1800A. Set up in your shop in operating condition. Less than ½ new price | 12,000.00 |

MISCELLANEOUS FOUNDRY EQUIPMENT

| | |
|---|---|
| U. S. 7½ HP 3 speed grinder; 28" wheel | 450.00 |
| U. S. Adjustable speed grinder-Model 64; 20" x 2" x 3" | 550.00 |
| Ingersoll-Rand pneumatic hoist, size C | 150.00 |
| Beardsley & Piper Sandslinger; 19" head 4" cup, 4' ramming arm | 1750.00 |
| Model S B & P Screenerator | 225.00 |
| Royer Screenerator | 250.00 |
| Climax Wire Straightener | 400.00 |

**FOR THE BEST DEAL CALL**

**BALCHER MACHINERY COMPANY**

**695 E. 152nd STREET**

**CLEVELAND 10, OHIO**

**TELEPHONE: GLENVILLE 1-2474**

## For Sale

## For Sale

**REAL ESTATE SOLD — MUST VACATE**

| | |
|---|---|
| 1—American Tablast, Mod. 3WA, ser. #A56827, 10' table with four 4' revolving tables. Motors & Controls, 3/60/220-440. 1948 Machine. LIKE NEW | $5250.00. |
| 1—American Dustube Dust Collector, 2 Hopper. Model used with 3WA Tablast above. LIKE NEW | $750.00. |
| 1—Paxton Cupola, 42", cap. 6 to 7 tons per hr. | $750.00. |
| 1—Carman Cupola Barometer, Mod. #B2, ser. #2430 | $100.00. |
| 4—Osborn Jolt Rollover Molding Machines, Mod. #2047-3, ser. #10,000 series, floor type, size 22" W x 30" L. LIKE NEW | $750.00 each. |
| 1—Champion Stationary Floor Type Molding Machine, size 38" x 40" x 10" draw. Condition: EXCELLENT | $650.00. |
| 1—Osborn Jolt Rollover, portable, size 22" x 32" | $650.00. |
| 2—International Molding Machines, Mod. L19D ser. #33323, mod. #LJ5D, ser. #42101, portable, 12" cyl. | $150.00 each. |
| 1—Royer Sand Blender, ser. #ND-P40, cap. 800/1000# per min. Motor 2 HP, 3/60/220-440 | $210.00. |
| 1—Grand Rapids Blower, Fan Type, 14" inlet & outlet. Motor 7½ HP, 3/60/220-440. | $190.00. |
| 1—Champion Blower, #25, 4' dia. Cone Type Dust Collector & Piping. | $110.00. |
| 1—Ruemelin Blower, Rotary Type 60 H, 500 cu. ft. per min. Motor 1 HP, 3/60/220-440. LIKE NEW | $95.00. |

**DICKSON CITY MFG. CO., INC.**

**DICKSON CITY, PA.**

**PHONE OLYPHANT, PA.—HUNTER 9-1131 OR**

**COVINGTON, PA.—2811**

**FOR SALE**

American Sandcutter, size 89/70. Model M in excellent condition. Good buy.

**KEEN FOUNDRY COMPANY**

**GRIFFITH, INDIANA**

**FOR SALE**

**Sand Conditioning Unit**

National Utility Sand Condition Unit—Used one year. Screens sand, removes all iron including fine shot. Ideal for jobbing and semi-production foundries. May be seen in operation until June 1, 1956 before dismantling.

**PIONEER FOUNDRY & MFG. CO., INC.,**
**P.O. BOX 118**
**GILBERTVILLE, MASS.**

**FOR SALE**

#4 Modern cupola, blower, motor, power rollovers, jolt squeezers, core ovens, sand equipment, core blowers, many other items.

**SOMIL EQUIPMENT & SUPPLY COMPANY**

**SOUTH MILWAUKEE, WISCONSIN**

**PHONE: SO 2-3880 or BR 1-7060**

**FOR SALE**

1—PORBECK CORE OVEN, style 3-c-3, 48" x 60" double ended gas fired oven with four—7" drawers and one—8" drawer. One year old. Address: GREAT LAKES PIPE COMPANY, 7286 W. GRAND RIVER, BRIGHTON, MICHIGAN.

**FOR SALE**

Champion CB 18 Core Blower widened between side uprights to accommodate core boxes 40" long. Blower has never been used. Address: LA PORTE FOUNDRY COMPANY, LA PORTE, INDIANA.

**FOR SALE**

#4 Sly Blast Mill, complete with motor and reducer in very good condition. Address: EUCLID BRASS FOUNDRY, INC., 1701 OCTAVIA ROAD, CLEVELAND 12, OHIO.

**FURNACES FOR SALE**

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

**FOR SALE**
**MOTORS—GENERATORS**
**TRANSFORMERS**
Unused — Rebuilt
WORLD'S LARGEST INVENTORY
**ELECTRIC EQUIPMENT COMPANY**
Phone Station Collect GLenwood 6783
P.O. Box 51—Rochester 1, New York

**FOR SALE**

Detrex Degreaser, Model US800-S, Size 84-36-36 with 2 baskets. Purchased Jan. 1955. Like new. Three Osborn Drag Molding Machines, type 332-49.

Link-Belt Mold Conveyor, including drive and 98 cars size 24" x 60".

**ALBION MALLEABLE IRON COMPANY**
**ALBION, MICHIGAN**

**FOR SALE**

22—#12 Haynes Squeezer
7—# 7 Haynes Squeezer

**THE NEWNAM FOUNDRY COMPANY, INC.**
**BOX 271**
**KENDALLVILLE, INDIANA**

**FOR SALE**

One 3-phase, direct arc electric steel furnace.

**BOX 991, FOUNDRY**

**PENTON BLDG. CLEVELAND 13, OHIO**

**FLASKS FOR SALE**

20—Sterling, style E, 12 x 18—4" drag, 4" cope, ⅝ pin screw, never used. Address: Box 993, FOUNDRY, Penton Building, Cleveland 13, Ohio.

**FOR SALE**

2" and 4" soil pipe machines, core machine and arbors. 100 shell type fitting patterns and snap binders. All or any part cheap. Address: HERBERT J. BROWN, 2008 PORTLAND AVENUE, SHREVEPORT, LOUISIANA.

**FOR SALE**

Commercial or industrial site, 2¼ acres, 9 buildings, 30,000 ft. covered space, P.R.R. Siding, all utilities. Low taxes, rapidly growing municipality, 50 miles New York, 70 miles Philadelphia and Atlantic City. Ideal factory, terminal, or warehouse site. Address: P. O. BOX 388, FREEHOLD, NEW JERSEY.

## For Sale

**SAND BLASTING EQUIPMENT**
**We Buy, Sell and Trade**

| | | |
|---|---|---|
| 27 x 36 | Wheelabrator, steel belt | $3000.00 |
| 36 x 42 | Wheelabrator, steel belt | 3000.00 |
| 42 x 48 | Wheelabrator, steel belt | 3000.00 |
| 48 x 48 | Wheelabrator, steel belt | 5000.00 |
| 15 Inch | Continuous Wheelabrator | 2500.00 |
| 6 ft. | Wheelabrator, flat top | 2500.00 |
| 6 ft. | Pangborn L.F. Table | 3000.00 |
| 9 ft. | Pangborn L.F. Table (one side throw wheel) | 4000.00 |
| 9 ft. | Pangborn L.F. Table (two side throw wheel) | 5000.00 |
| 6 ft. | Pangborn Air Table | 975.00 |
| 9 ft. | Pangborn L.F. Table with spinner tables | 2500.00 |
| 1½ cu. ft. | Pangborn air blast barrel | 350.00 |
| ES-421 | Pangborn shell blasting machine | 3000.00 |
| Tumbling Barrels, horizontal and vertical | | 150.00 |

Hand Blast Cabinets—Pangborn, American and Ruemelin.
Dust Collectors, all sizes from 100 to 20,000 C.F.M.

**DIAMOND SAND-BLAST, INC.**
**5654 WEST JEFFERSON**
**DETROIT 9, MICHIGAN**
**PHONE: VINEWOOD 3-6751**

**FOR SALE**

1—Hydroscale—3000 lb. capacity—12 inch dial, 5 pound graduation—like New ..... $195.00
1—Porter Cable 15 Inch Disc Sander .... $95.00

**DOSTAL FOUNDRY AND MACHINE CO.**
**PONTIAC, MICHIGAN**

**FOR SALE**

1—S.P.O. #2166—16" cylinder
1—S.P.O. #9546—trunion rollover
1—S.P.O. #SC10DA hollow core machine
1—B&P #30-14-PCA Rol-A-Cor, automatic

**FOUNDRY SUPPLY COMPANY**
**7600 HIGHWAY NO. 7**
**MINNEAPOLIS, MINNESOTA**

## For Sale

**FOR SALE**

MOLDING MACHINES
1—Tabor 22" Power Jolt, Rollover, Draw, Portable, 22" x 32" Table.
1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.
2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.
2—International, Jolt, Rollover Draw, 20" x 8-G. Portable.
2—No. 275 Osborn jolt squeezers. Stationary.
CORE OVENS
1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.
1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.
BLOWERS FOR CUPOLAS AND FURNACES
1—Connersville Rotary Blower, 3500 CFM.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.
1—Connersville rotary blower 22 x 66 45 cu ft per revolution 9000 CFM.
Maxson-Premix Blowers for Gas ¼ to 1 HP.
2—2 HP 20-oz. Spencer Turbine Blowers.
2—Spencer Turbine Blowers, 2700 CFM, 27 oz., 30 HP, 3/60/220-440 V.
METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnace, gas fired.
1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# A1, Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
MISCELLANEOUS
1—Curtis 2 cyl. 25 h.p. compressor unit.
1—Pangborn 1 to 4 nozzle air blast generator, complete.
1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.
1—Pangborn EN-2 Sand Blast Cabinet.
1—Sly Tumbler 24" x 40".
1—International SB-11 core blower.
2—Pangborn cloth screen collectors, 2 HP.
1—Stoney crane type shakeout.
1—NPD Royer sand separator.
1—#16 Roto-clone unit complete.
Complete stock of rebuilt mill and dust exhaust blowers.

**CLIFTON MACHINERY COMPANY**
**1023 W. SIXTH ST. CINCINNATI 3, OHIO**

## For Sale

**FOR SALE**

We have the best selection of HARD CHROME REBUILT PNEUMATIC TOOLS WE HAVE EVER HAD.

Ingersoll-Rand Size 24 Floor Rammers
Ingersoll-Rand Size 14 Bench Rammers
Cleco Bench Rammers
Chipping Hammers—All types
Core Breakers and Grinders

Our prices are about half the cost of new tools. All tools sold by us are guaranteed and can be returned if found not satisfactory.

**CENTRAL PNEUMATIC SERVICE COMPANY**
**512 LINDEN AVE., DAYTON, OHIO**
**TELEPHONE: MADISON 2701**

**FOR SALE**

1—Simpson Mixer #2, 20 HP motor.
Miscellaneous: Screens, Pulverizers, Grinders, Tyler Rotap Screens, etc.
Wanted: Your Idle Machinery.
OUR 39th YEAR.

**CONSOLIDATED PRODUCTS CO., INC.**
**66 BLOOMFIELD STREET**
**HOBOKEN, NEW JERSEY**
**HO 3-4425 N. Y. TEL. BA. 7-0600**

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**HOTEL AMBASSADOR**

# WHITEHEAD EQUIPMENT CORP.

**P. O. BOX 939** **PHONE: 54379** **READING, PA.**

# AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

## AIR HOISTS

75—INGERSOLL RAND RC-5, 500 lbs.
10—INGERSOLL RAND LC-7, 700 lbs.
3—INGERSOLL RAND Size "AN" 500 lbs.
6—INGERSOLL RAND Size "BN" 1000 lbs.
1—INGERSOLL RAND Size "E" 10,000
5—CHICAGO PNEUMATIC 2-3-5 Ton Cap.
16—DETROIT 1-2-5 Tons Cap.
3—THORS 2-3-5 Tons Cap.

## BUCKET ELEVATORS

1—LINK BELT 30' Centers, 10" x 7" Buckets, w/Motor and Drive.
1—LINK BELT 35' Centers, 12" x 7" Buckets, w/Motor and Drive.
1—LINK BELT 40' Centers, 14" x 7" Buckets, w/Motor and Drive.
1—LINK BELT 50' Centers, 16" x 8" Buckets, w/Motor and Drive.

## AIR TOOLS

200—INGERSOLL RAND & CHICAGO PNEUMATIC, Grinders, Chippers, Bench & Floor Rammers.

## ELECTRIC HOISTS

1—Comet 1000 lbs. capacity.
1—SHAW Box 1000 lbs. capacity.
1—ROBBINS & MEYERS, 4000 lbs. cap.

## CUT-OFF MACHINES

1—DEWALT model ME2 cut-off saw, 10 HP motor, 24" Carboloy blades.
3—TABOR model C10AF, Abrasive Disc, 16" Wheel, 10 H.P. Motor.
1—GROB Band Saw, Type OS-36, open end, 36" throat, MD.
1—DRAVO-DOYLE 6 cu. ft. CMC Wonder Model, 5 HP.

## CORE ROD STRAIGHTENERS

1—AMERICAN Type D, Pneumatic ¾" Straightener, 1¼" Shear.
2—CLIMAX #2, 2A, 1/16" to ¼".
1—CLIMAX #3, ¼" to ⅝", Length 10".

## CORE GRINDERS

2—MILWAUKEE Rotary Type, Model 70-12, 70" Dia. Table, Very Late.

## CORE BLOWERS

2—CHAMPIONS CB 10, Max. Core 10 lbs.
2—CHAMPIONS CB 400, Max. Core 300.
1—DEMMLER No. 55 Max. Core 6 lbs.
1—DEMMLER No. 1, Max. Core 10 lbs.
1—DEMMLER No. 1-E, Max. Core 10 lbs.
2—DEMMLER No. 2K, Max. Core 20 lbs.
2—DEMMLER No. 2E, Max. Core 20 lbs.
2—DEMMLER No. 2, Max. Core 20 lbs.
2—DEMMLER No. 3, Max. Core 35 lbs.
2—DEMMLER No. 3K, Max. Core 35 lbs.
2—DEMMLER No. 3E, Max. Core 35 lbs.
1—DEMMLER No. 4, Max. Core 100 lbs.
1—DEMMLER No. 4E, Max. Core .. lbs.
2—INTERNATIONALS No. SB, 11 Max. Core 15 lbs.
2—INTERNATIONALS No. SB 13, Max. Core 30 lbs.
2—OSBORN No. 92, Max. Core 35 lbs.
2—OSBORN No. 192, Max. Core 50 lbs.
2—OSBORN No. 193, Max. Core 75 lbs.
6—MILWAUKEE TACCONE Model A-3, Max. Core, 4 lbs.
1—REDFORD #1 Bench Type w/cartridges.

## CORE OVENS

1—INDUCTION Heating Dialectric, Model M-800A, 600 lbs. per Hr. New.
1—INDUSTRIAL "Revolving Carriers" Continuous, Trays 18" x 80", Gas Fired.
1—YOUNG BROS. 2-Comp. 10 Drawers, Overall 9' x 12' x 8', Gas Fired.

## CORE ROOM MISC.

37—NEW CORE RACKS, 5' 6" Wide, 6' High, 4' Deep, 5 Shelves, Knocked Down.
20—OSBORN, INTERNATIONAL & TABOR Core Rollovers, Various Sizes.

## CUPOLA BLOWERS & ACCESSORIES

1—ROOTS CONNERSVILLE, Size 20 x 44, 7000 CFM, Type HD, 50 HP Motor.
4—LINDBERG Centrifugal Blowers 2100 CFM, with 15 HP Motors.
1—BASIC REFRACTORIES BRI Gun, Model 110. For lighting cupola.
5—WHITING 42" Dia. Charging Buckets.
1—CUPOLA Bondactor.
1—I & R Single Stage FS-367, 100 HP, 9400 CFM.

## DUST COLLECTORS & ROTO-CLONES

1—AMERICAN Air Filter No. 12, Type W, arrangement "C," with Sludge Ejector.
1—AMERICAN Air Filter No. 14, Type W, arrangement "C," with Sludge Ejector.
1—AMERICAN Air Filter No. 27, Type W, arrangement "C," with Sludge Ejector.
1—AMERICAN Air Filter Type N, Size 10 with Bench.
1—AMERICAN Air Filter Type N, Size 20, 20,000 CFM, with 75 HP Motor.
1—AMERICAN Air Filter Type N, Size 24, 24,000 CFM, 75 HP Motor.

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AT THE
AMBASSADOR HOTEL
May 3 - 9
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INVITES YOU TO BECOME
ACQUAINTED WITH THE MEN
YOU HAVE DEALT WITH
THROUGHOUT THE
YEARS
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ATLANTIC
CITY

## ELECTRIC ARC MELTING

2—DETROIT Rockers, Indirect Arc, Type AA, 750-1000 lbs. capacity. Complete with 200 KVA Transformers, Control Panels, Automatic Electrode Holders.
2—DETROIT Rockers, Indirect Arc, Type AA, 1000-1500 lbs. capacity. Complete with 250 KVA Transformers, Control Panels, Automatic Electrode Holders.

## GAS & OIL FIRED FURNACES

1—LINDBERG FISHER Model MNP, Size 225, Electric Tilt, with Motor & Blower.
6—LINDBERG FISHER Model MNP, Size 1700, Electric Tilt, with Motor & Blower.
3—LINDBERG FISHER Model MNP, Size 2400, Electric Tilt, with Motor & Blower.
2—LINDBERG FISHER, Type BB1, Size 225, Hand Tilt, with Motor & Blower.
12—LINDBERG FISHER, Model SSH, Size 550, Stationary, Motor & Blower.
6—LINDBERG FISHER, Model SSH, Size 150, Stationary, Motor & Blower.
3—LINDBERG FISHER, Model SSH, Size 60, Stationary, Motor & Blower.
10—CAMPBELL HAUSFIELD, Stationary, Size 125 to 250, Motor & Blower.
2—CAMPBELL HAUSFIELD, Model 1PNT, Size 2000 lbs., Electric Tilt, with Motor & Blower.

## GRINDERS—SWING FRAME

1—MARSHKE, 12" x 2", 3 HP.
1—MARSHKE, 20" x 10", 10 H.P.
2—FOX, No. 6, 24" x 10", 15 HP.

## GRINDERS—SNAGGING

3—U. S. ELECTRICAL, No. 65, 24" x 3" x 12" Wheel, 15 HP, 4-Speeds.
3—U. S. ELECTRICAL, No. 65, 30" x 4" x 12" Wheel, 20 HP, 4-Speeds.
2—U. S. ELECTRICAL, No. 64, 14" x 3" Wheel, 7½ HP, 4-Speeds.
1—HAMMOND, Model WR-1, 24" x 3" x 12" Wheel, 10 HP.
2—SAFETY RITES, No. 174, 24" x 3" x 12", 10 HP.

## GRINDERS—DISC

1—QUEEN CITY, Model 100 Double End Disc Grinder, wheel size 20" x 2" x 2", with 10 HP Motor.
1—U. S. ELECTRICAL TOOL, No. 80, Double End Disc Grinder, Wheel size 16" x 3", with 7½ HP Motor.

## HEAT TREAT FURNACE

2—LINDBERG, Model 4860 GH, Gas Fired 48" x 60", Recirculating, with L & N Controls to 1250° F.
1—LOFTUS ENGINEERING CORP. Annealing, Walking Beam Type, Gas Fired. 1600°, Recirculating, 10' x 12' x 40'.
1—AJAX MFG. Electric, ID 54' Long, 46" Wide, 36" High, 800°, Single Phase..

## HOUGH PAYLOADERS

2—HOUGH model HA, 12 cubic ft. capacity, hydraulic buckets.

## INDUCTION—MELTING HEAT TREAT

1—GENERAL ELECTRIC MG Set, 300 KW, 450 HP Motor, 3000 Cycles, with Starter & Panel Boards.
1—GENERAL ELECTRIC MG Set, 1250 KW, 1850 HP Motor, 3000 Cycles.
1—LEPEL Spark Gap Converter, 30 KW.

## LADLES

3—WHITING Cylindrical, 275 lbs. 19" x 26".
6—MODERN Cylindrical, 1500# 20" x 30".
1—MODERN mixing, 44" x 44", on wheels, 4000 lbs.
2—STEVENS Cylindrical, 2450 lbs. 29½" x 41½".
12—WHITING Lip Pour, 1200 lbs., 23" x 23".
6—MODERN Lip Pour, 1600 lbs. 24" x 24".
4—MODERN FA-9 Pouring Devices and 400# Ladles.
2—WHITING Lip Pour, 2000 lbs., 29" x 29".
3—WHITING Lip Pour, 4000 lbs., 32" x 32".
1—WHITING Lip Pour, 6000 lbs., 36" x 36".
3—WHITING Lip Pour, 5000 lbs., 34" x 34".
1—WHITING Lip Pour, 8000 lbs., 44" x 48".
2—WHITING Lip Pour, 10 ton cap. 62" x 62".
1—WHITING "U" Type; 5900 lbs.
1—WHITING teapot, 4000 lbs., 32" x 32".

## MOLDING MACHINES JOLT SQUEEZERS

2—MILWAUKEE No. 123, 12" cyl., stationary.
2—MILWAUKEE No. 104, 10" cyl., portable.
8—OSBORN No. 275 JW, Straddle Type. 10" Cyl., Portable.
16—OSBORN No. 275J, 10" Cyl., Portable.
3—OSBORN No. 276J, 12" Cyl., Portable.
6—OSBORN No. 210 PJ, Swing Back Head, 10" Cyl., Stationary.
6—OSBORN No. 212 PJ, Swing Back Head, 12" Cyl., Stationary.
1—CHAMPION No. JS-10-P, 10" Cyl., Swing Back Head, Portable.
20—SPO No. 110J, 10" Cyl., Portable.

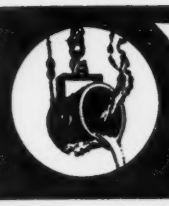
## JOLT ROLLOVER PATTERN DRAW

1—DAVENPORT No. 28R, 34" x 48" Table, 12" Draw.
1—DAVENPORT No. 40-SA, 42" x 50" Table, 3000 lbs. Jolt, 18" Draw.
1—DAVENPORT model 24SA, 24" x 30" table, 12" draw, 1200 lbs. capacity.
1—HERMAN #6000 Series, 42" x 78" Table, 6000 lbs. Jolt Cap., 20" Draw.

*NEW ILLUSTRATED "CONVENTION CATALOG" NOW IN THE MAIL, WATCH FOR IT!*

# AAA MACHINERY & EQUIPMENT CO.

**15539 SARANAC ROAD — CLEVELAND 10, OHIO — CALL LI. 1-6545**



# AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

1—HERMAN #1500 Series, Table 26" x 30", Jolt 1500 lbs.
1—DAVENPORT 24SA, 24" x 36" table, 8" draw, 1000 lb. Jolt.
1—MILWAUKEE 217 table 35" x 41", sq. cyl. 16", draw 12", Jolt 1200 lbs.
1—HERMAN #750 Series, Table 20" x 30", 750 lbs. Jolt.
6—INTERNATIONAL "R" Core Rollovers.
1—INTERNATIONAL "G" Size 20" x 8".
1—INTERNATIONAL "G" Size 24" x 10".
1—INTERNATIONAL "G" Size 30" x 12".
1—INTERNATIONAL RES, Size 15" x 8".
1—INTERNATIONAL Type "F," 31" x 54", Draw 16", Jolt Cap. 2500 lbs.
1—JOHNSTON & JENNINGS model 918, 44" x 54" table, 20" draw, 2000 lbs. cap.
1—JOHNSTON & JENNINGS 815-B table 30" x 40", draw 15", jolt 1500 lbs.
1—MILWAUKEE #167, Table 32" x 33", Draw 12", Jolt 1000 lbs., Sq. Cyl. 16".
1—MILWAUKEE Model 60B-3, 60" flask, 18" draw.
10—OSBORN No. 40 and 42, Hand Core Rollovers, 18" x 8" Draw.
1—OSBORN No. 342, Table 23" x 38", Draw 10", Jolt 1000 lbs.
1—OSBORN No. 442, Table 21" x 31", Draw 10", Jolt 600 lbs.
1—OSBORN No. 242W, Table 29" x 42", Draw 19", Jolt 1500 lbs.
2—OSBORN No. 405, Table 57" x 64", Draw 26", Jolt 3000 lbs.
6—OSBORN No. 601, 30" wide Flask, 10" Draw, 750 lbs. Jolt.
6—OSBORN No. 602, 36" Wide Flask, 10" Draw, 750 lbs. Jolt.
2—OSBORN No. 332, Flask Size 26" x 36", Draw 9", Sq. Cyl. 16", 1500 lbs. Jolt.
1—SPO No. 413D, Table 24" x 25", Draw 10", Jolt 600 lbs., Sq. Cyl. 13".
1—SPO No. 507, table 32" x 40", draw 10" to 20", jolt cap. 1500 lbs.
1—SPO model 506, portable, 24" x 30" table, 10" draw, 600 lbs. capacity.
3—TABOR, Size 30" x 40" Table, 12" Draw, 1000 lbs. Jolt Cap. Portable & Stationary.
4—TABOR, Size 22" x 32", and 22" x 42", Draw 10", Jolt 600 lbs.

## JOLT PIN LIFT

2—DAVENPORT model 24 AJS, 24" x 30" table, 8" draw, 1000 lbs. capacity.
1—DAVENPORT No. 40 AJS, Table 44" x 54", Jolt 4000 lbs., Draw 18".
1—INTERNATIONAL LP10, 30" x 30" Table.
2—MILWAUKEE No. 620 ND, 24" x 30" Table, 2000 lbs. Jolt.
2—OSBORN No. 559, Table 25" x 30", Draw 6", Jolt 1200 lbs.
1—OSBORN No. 563, Table 55" x 63", Draw 12", Jolt 7000 lbs.
1—SPO model 307, 24" x 30" table, 8" draw, 1000 lbs. capacity, Portable.
1—TABOR, Table 22" x 32", Draw 10", Jolt 600#.

## JOLT SQUEEZE PIN LIFT

1—INTERNATIONAL PKL, 12", Squeeze Cyl., 6" Draw.
1—MILWAUKEE 125-3, Table 21" x 27", Jolt 1200 lbs. Draw 8", Sq. Cyl. 12".
1—MILWAUKEE No. 163, Table 15" x 24", Draw, 8", Jolt 1500 lbs., Squeeze Cyl. 16".
1—OSBORN model 712 PJ, squeeze cylinder 12", table 18" x 28", draw 6".
1—OSBORN 175J table 18" x 21", draw 5" sq. cyl. 10".
2—OSBORN No. 710J Table 17" x 21", Squeeze Cyl. 10".
1—OSBORN No. 716 PJ, Table 22" x 34", Draw 7", Squeeze Cyl. 16".
1—SPO 2114, table 20" x 27", 4" draw, 600 lbs. jolt, 11" cyl.
1—SPO 2146, table 21" x 31", 6" draw, 14" cylinder, portable.
1—SPO 2136G, table 19" x 26", 6" draw, 13" cyl. portable.

## JOLT (BUMPERS)

1—HERMAN, 40" x 60" Table, 13" Cyl. 6000 lbs. Jolt.
1—MILWAUKEE No. 4050, 40" x 50" Table, 12" Cyl.
1—TABOR, Table 30" x 40", 2800# cap.

## MATERIAL HANDLING EQUIPMENT

1—ERIE ¾ yard clamshell bucket, single line.
1—INGERSOLL RAND, Size MHU, Air Winch, 2000 lbs. Cap.
6—LEWIS SHEPPARD Platform Hand Lift Trucks (For Core Room).

## CONVEYOR BELTS

1—JEFFREY Trough, 20" x 35' centers.
1—JEFFREY Trough, 24" x 103' Centers.
1—JEFFREY Trough, 24" x 145' Centers.
1—JEFFREY Trough 24" x 35' centers.
1—LINK BELT Flat 24" x 40' Centers.

## STEEL APRON CONVEYOR

1—JEFFREY 24" x 60' Centers.
1—LINK BELT 36" x 100' centers, motor and drive.

AAA AT THE AMBASSADOR HOTEL May 3 - 9 CORDIALLY INVITES YOU TO BECOME ACQUAINTED WITH THE MEN YOU HAVE DEALT WITH THROUGHOUT THE YEARS • ATLANTIC CITY

## VIBRATING CONVEYOR

1—LINK BELT 36" x 40'.
3—SIMPLICITY Model OA-10-A, 36" x 15'.

## PORTABLE TROUGH CONVEYOR

1—FARQUHAR, 18" x 35'.

## OSCILLATING CONVEYOR

1—LINK BELT 48" x 154'.

## CHAIN CONVEYOR

500' JARVIS No. 678, complete with drives.

## UNDER CAR UNLOADER

1—FARQUHAR, 18" x 19'.

## TRAMRAIL

3—LOUDEN MONORAIL SYSTEMS, "Super Track"
(1) 110' of 6" I-beam & two 20' bridges
(2) 140' of 6" I-beam & two 12' bridges
(3) 130' of 11" I-beam & two 30' bridges; All Complete.

## OVERHEAD CRANES

1—WHITING 5 ton Overhead Crane, 50' span, Cab Operated, AC.

## MOLD DRYERS

1—PORBECK Mold Dryer, 42" wide, 8' long, oil fired, Serial No. 242.

## MOLD CONVEYOR

1—WEBB 109 Cars, Car Tops 32" x 39".
1—LINK BELT, 98 Cars, Car Tops, 32" & 39".

## ROLLER CONVEYOR

150' MATHEWS 36" wide, 3½" rollers, 6" centers, 6" channel, 1¼" shaft dia.
640' MATHEWS 16" wide, 2⅞" rollers, 4" centers, 4" channel.
40' MATHEWS 18" wide, 2⅞" rollers, 4" centers, 4" channel.

## SAND MULLERS

1—BAKER PERKINS No. 16½, 30 HP motor.
1—BEARDSLEY & PIPER, #50 with Skip Hoist, Dust Hood, 50 HP.
1—CLEARFIELD, #404 Batch, 4 Cu. Ft.
1—CLEARFIELD, #610 Batch, 6 Cu. Ft.
1—SIMPSON, #1 Style B, Single Wheel, 400# Batch.
1—SIMPSON, #3 Style C, Enclosed Gears —3000#.
1—SIMPSON, #2, Style UD, 1500 lbs. Batch. With Loader.
1—SIMPSON, #2, Style C, 1500 lbs., with Loader. Enclosed Gears.
1—SIMPSON #1, style UD, 500 lbs. batch.

## SAND PREPARATORS

1—B & P, No. 40, 40 Ton Hopper.
6—B & P Screenarators, Models—M & L.
1—PEKAY Aerator, Model 320-3. (For Sand System).
8—ROYERS, Models NDP-C-2, NC-4.
1—SIMPLICITY LB 2'x3', Portable, 3 HP.

## SAND CUTTERS

1—AMERICAN, Model BD-Size 75/60.
1—AMERICAN, Model M-Size 99/80.
1—AMERICAN, Model M-Size 89/70.
2—MOULDERS' Friend 50" and 60" brush.

## SAND SLINGERS

1—B & P, 19" Tractor Type, 13' Arm.
1—B & P, 16" Tractor Type, 13' Arm, Magnetic Tower, 4' Ramming 4" Tip.
2—B & P, Model 16S-DB Stationary Type, 16" Head.
1—B & P Stationary-Double Belt Model, 5' arm, 4' Ramming, 19" Head, 4" tip. Never Used.

## SHAKEOUTS & SCREENS

4—SIMPLICITY 4' x 6' Model B, 5000#.
1—SIMPLICITY 4' x 10' Model D, 16,000#.
1—ROYER Combination Shakeout & Sand Conditioning unit, Serial #ST-47.
1—HEWITT-ROBINS 36" x 78", Vibrex Screen, Style M-7.
1—LINK BELT 5' x 10' heavy duty.

## TUMBLING BARRELS

1—ROYERSFORD 36" x 60", 5 HP Motor.
2—SLY 42" x 72" Square, 10 HP, Gearhead with Built-in Brake. Timken Bearing.
2—SLY 36" x 84" Type C, 7½ HP. Gearhead Built-in Brake. Timken Bearing.
4—WHITING 48" x 72", 10 HP Gearhead, with Built-in Brake. Timken Bearing.

## WHEELABRATORS

1—AMERICAN 86" diameter swing table with dust collector.
1—AMERICAN No. 3 tablast, 4-48" auxiliary tables.
1—AMERICAN No. 1 tablast 7-14" auxiliary tables.
1—AMERICAN 36" x 42" Tumblast with Skip Hoist.
1—AMERICAN 42" x 48" Tumblast, with Skip Hoist.
1—HOLLINGSWORTH Model 44" x 48" Tumblast.
1—HYDRO-BLAST cabinet, 40 HP motor and pump.
1—PANGBORN Shot Blast Room 10' x 12' x 14', with Dust Collector, Elevator.
1—PANGBORN 9LG, 9' Table, 8-24' Tables.

## TESTING EQUIPMENT

1—GENERAL ELECTRIC X-Ray, Industrial Type, Model KX10, 140 KW.
1—STEEL CITY Brinell Hardness Tester, Model UK 300, To 3000 Kilograms.

*ASK TO HAVE OUR CATALOGS DIRECTED TO YOUR ATTENTION*

**AAA MACHINERY & EQUIPMENT CO.**

**15539 SARANAC ROAD — CLEVELAND 10, OHIO — CALL LI. 1-6545**

# ELECTRIC melting furnaces

**BUY FROM SPECIALISTS...LARGEST, MOST COMPLETE STOCKS**

Swindell Electric Furnace, 5′ dia. shell, 350 KVA, 6600 volts.

Swindell Electric Furnace, 4′ dia. shell, 250 KVA, 6600 volts.

Swindell Electric Furnace, 5′ dia. shell, 500 KVA, 6600 volts.

Allis Chalmers Induction Melting Furnace, 2-600# pots.

Ajax Northrup High Frequency Induction Furnace, spark gap type, 35 KVA with 60# and 17# melting pots.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformer. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Pennsylvania 1500 KVA transformer, 12,000 V. Never used since rebuilt. With complete controls, mostly new, needed for operation of a furnace. New control panel, Field Rheostat, 25 HP, 440 V MG set.

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

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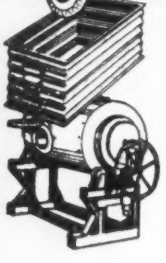
**EUCLID FOUNDRY & MACHINE EQUIPMENT CO.**

**14919 SARANAC ROAD CLEVELAND 10, OHIO**



**CONVEYORS:**

**APRON CONVEYORS:** Midwest—36″ x 120′ Palmer-Bee—30″ x 19′, 30″ x 5′6″.

**MOLD CONVEYORS:** 1 — Webb heavy duty 356′ 109 cars 32″ x 39″; 1—Link Belt 27′ x 70′6″, 35 cars 38″ x 72″.

**BELT CONVEYORS:** Flat Belt—20″, 24″ 30″, 36″ Troughing—3—24″ x 22′, 1—24″ x 350′.

**BUCKET CONVEYORS:** 2—40′, 3—50′, 8″ x 16″ buckets.

**AIR COMPRESSOR:**

1-I-R two stage 800 CFM 150 HP 3/60/220

**OVERHEAD CRANES:**

1—3 ton Bedford—40′ span, 120′ runway
1—3 ton Shepard—Monorail 25 HP, 550 DC
1—Chisholm Moore Cupola Charging with 200′ rail 550v 3/60

**ASK FOR OUR COMPLETE LISTING!!**

**TUMBLING MILL:**

60″ x 72″ Ransohoff tumbling type wet cleaning mill, Serial No. 6318, drive 15 HP 3/60/220 and bucket loader 5 HP 3/60/220

**MAGNESIUM CLEANING CABINETS**

7—Whirlpool Duplex, 800 CFM, 100″ wide x 65″ deep x 90″ high. Buffalo exhausters—7½ HP., 220/440

**WE BUY AND SELL ONE PIECE OF EQUIPMENT OR COMPLETE FOUNDRIES**

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**GUARANTEED FOUNDRY EQUIPMENT**

# BARGAIN PRICES

# GUARANTEED REBUILT EQUIPMENT

### AIR COMPRESSORS
1—INGERSOLL RAND 2 stage, Horiz., 50 HP, 200 CFM
1—WORTHINGTON Type "YB", 75 HP, Synchronous, 450 CFM

### BLOWERS
1—85 HP G.E. Cupola Blower, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

### CLEANING EQUIPMENT
1—AMERICAN #1 MULTITABLE, 6 aux. tables 15", main table 45".
SHAKEOUT 4' x 6'.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
5—US GRINDERS, double end, 10, 15, 20 HP.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.
1—AMERICAN WHEELABRATOR 36 x 42 Tumblast w/Skip Hoist
1—AMERICAN WHEELABRATOR 42 x 48 Tumblast
1—AMERICAN WHEELABRATOR 48 x 48 Tumblast
1—PANGBORN Rotoblast #14GK2 w/Skip Hoist
1—PANGBORN Rotoblast #28GK2 w/Skip Hoist
1—PANGBORN Tablast, 9' Plain Table, w/Elevator

### CONVEYORS
1—LINK BELT Double Deck Oscillating, 80' long x 24" wide, 1954.
1—45' x 24" wide APRON CONVEYOR
4—SAND ELEVATORS, various sizes.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.

### CUPOLAS
2—Whiting #9 w/Blowers & Foxboro Controls
1—WHITING #4 w/Blower & Control
1—MORRIS #9, w/skip, mixing ladle, never used.
1—MODERN, #3, 46' shell, w/blower.
2—MODERN #7; Blowers & Controls.
1—SKIP CHARGER, 3 bottom drop buckets, scale for #9 cupola.

### CORE BLOWERS
1—#1 DEMMLER
3—#2 DEMMLERS
1—#55 DEMMLER
1—#3K DEMMLER
1—#3 DEMMLER
1—#SB11 INTERNATIONAL
2—#SB13 INTERNATIONAL
1—#93 OSBORN
1—#193 OSBORN

### FLASKS
150—HINES & FREEMAN ALUM. Pop-offs and jackets, send for list.
TRANSITE CORE PLATES, send requirements.

### FURNACES—DIRECT ARC MELTING
1—3 Ton LECTROMELT, Top Charge
1—3000#/hr. LECTROMELT.
1—1000#/hr. HEROULT.
1—2000#/hr. HEROULT.
2—3000# HEROULTS.
1—3 Ton HEROULT.
1—6 Ton HEROULT.

### FURNACES—INDIRECT ARC
1—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—2000# DETROIT, complete.

### FURNACES—INDUCTION MELTING
1—175 KW AJAX, complete.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
2—60 KW AJAX, 60 Cycle, 400#, Alum.
1—7½ KW TOCCO.
1—20 KW AJAX Spark Gap High Freq.
1—3 KW AJAX, Lab. type.
1—30 KW LEPEL.
1—50 KW, G.E., MG Set, 960 cycle.

### FURNACES—OIL AND GAS
1—FISHER 4 Burner MNP, 1700#, gas.
4—FISHER, Stationary Holding, 500#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—SKLENAR 600#, Oil fired.
1—HAUSFELD Tilting, 1200# Mag.
1—R & S Convection Draw, Car bottom, 18' 1 x 8' w x 5' h, oil fired, dismantled, controls.

### MOLDING MACHINES
#### Jolt Rollovers
2—J & J #1020, 50" x 60", 20" draw, 1953.
1—J & J #918, 44 x 54", 18" draw.
1—OSBORN #405, 64 x 50", 18" draw, 3000#.
1—J & J #612, 24" x 30", 12" draw.
2—J & J #815, 30" x 40", 15" draw, 1200# jolt.
1—HERMAN 10,000# Jolt
1—HERMAN, 8' x 12' Table.
2—HERMAN, 1500#, above ground.
2—HERMAN, 20" x 24", 750#.
1—HERMAN, 50" x 72", 6000# jolt.
1—HERMAN, 42" x 78", 6000# jolt.
1—OSBORN, #243, 27" x 40", 20" draw.
4—TABOR, 22" x 42", pattern draw, port.

#### Bumpers
1—OSBORN #102.
1—HERMAN, 60" x 72".

#### Jolt Strippers
4—MILWAUKEE #1536, 32" x 38".
4—SPO, 24" x 24".

#### Jolt Squeeze Strippers
1—OSBORN #175, 21" x 18", portable.
2—MILWAUKEE #163.
1—MILWAUKEE #165, 16" Pin Strip.
1—MILWAUKEE #124-6, 12" Pin Strip.

#### Jolt Squeezers
2—INTERNATIONAL, 17" x 20", port.
1—OSBORN #212 PJ, 17" x 23", stationary.
4—OSBORN #276-J.
3—OSBORN #275-J.
3—TABOR, 18" x 20", 3" jolt, column.
1—TABOR, 18" x 20", 3" jolt, cantilever.
1—ADAMS, 19" x 20" portable.
2—SPO #213-GP.
1—SPO #110-J.

### LADLES & POURING DEVICES
2—WHITING 3 Ton. Bottom pour.
4—10 TON BOTTOM POUR, 55" x 55".
2—45 TON TREADWELL, Excellent.
4—800# Worm Geared, Lip Pour.
3—1500# TEAPOT, Lip Pour, Worm Geared.
3—5 Ton to 9 Ton, Worm Geared, Lip Pour.
1—SWINDELL, Elec. Holding.

### MULLERS AND MIXERS
1—SIMPSON #0.
1—SIMPSON #3, enclosed gears.
2—SIMPSON #2, Unit Drive.
2—CLEARFIELD #610 and #920.
1—CLEARFIELD #404
1—B & P #60 Speedmuller
1—B & P SPEEDMULLER, #70.
1—B & P MULBARO, #7, extra Base.

### OVENS
1—TOWER CORE OVEN, 14" x 60" trays, 45' high, gas fired, dismantled.
2—ROSS 2 comp., rack, gas, 6½ x 14 x 7.
1—YOUNG BROS. 3 compartment, kiln type electrically heated, with CONTROLS.
1—YOUNG BROS. 3 door, gas, 12' x 8' x 6'-3", recirculating, blower and recorder.
1—COLEMAN, Double Door, Oil, Single Comp., Recirc., 60" wide x 14'6" deep x 80" high.

### SAND CUTTERS
4—AMERICAN SAND CUTTERS.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

### SAND LABORATORY EQUIPMENT
1—Complete SAND LABORATORY
1—TEST CORE BAKING OVEN #606.

### SAND PREPARATORS
2—JEFFREY SANDITIONERS, Portable.
2—ROYER SAND BLENDERS, 16" belt.
5—ROYER SAND BLENDERS, 12" belt.
1—LINK BELT REVIVIFIER, Size 5.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired #552.

### SAND SLINGERS
1—BEARDSLEY & PIPER MOTIVE JR, 19" head.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head magnetic separator.
1—PORTABLE SLINGER 16" head, 4' long, on Truck.
1—B & P Stationary, Double Belt, 16" head with 5 Ton Plate Feeder.

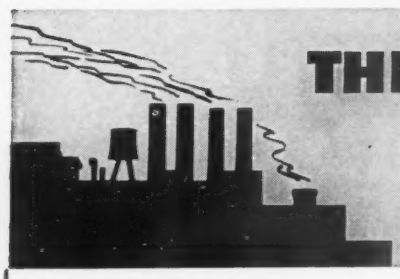
### TESTING MACHINES
1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINELL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—BALDWIN, UNIVERSAL, Hydraulic tensile, 60,000#.

### TRUCKS
1—HOUGH PAYLOADER, Model HA, Hydraulic Trip.
2—BELL PRIME MOVERS, 1000# capacity, gas driven.
1—LEWIS SHEPPARD, 4000#, elec. Fork Lift.

### MISCELLANEOUS
1—GARDNER VERTICAL DISC GRINDER.
6—PENN DUMP BUCKETS, 1000# to 4 ton.
4—CURTISS AIR HOISTS, barrel type.
1—HOFFCO Vacuum Cleaner, #75.
1—ALLEN-BILLMEYER Vacuum Cleaner, port.

**UNIVERSAL MACHINERY AND EQUIPMENT CO.**

**1630 N. Ninth St., Reading, Pa.** **Phone 3-5103**



# THE ACME *bargain page*

### AIR COMPRESSORS
Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 Hp, 3/60/220/1200 rpm synchronous motor, 350 CFM at 100#.
Ingersoll Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. Rebuilt 1952.

### AIR HOISTS
6—4000# Ingersoll-Rand, with trolleys.

### BLOWERS
Ingersoll-Rand Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220V G. E. Induction motor.
General Electric 7500 CFM, 20 oz., 89.6 Max. HP, 220V motor, Airway controls.
Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G. E. 220V 3500 CFM motor.

### CLEANING EQUIPMENT
Sly 8′ dia. Table Shot Blast Unit.

### CORE BLOWERS
3—International SB 12.
4—International SB 13.
10—Osborn 193.
1—Osborn 2035-2.
1—Champion CB 400.
2—CB 10 Late Type.

### CORE GRINDERS
5—Milwaukee 70-9.

### CORE OVEN VERTICAL HORIZONTAL
1—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman, combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

### CORE PASTE OVENS
2—Coleman Gas Fired 28′-25″ x 42″ opening.

### CRANES
1—Milwaukee 10 ton 40′ span, 22′ lift, 220 V. A.C.
2—Northern 5 ton 40′ span, 22′ lift, 220 V. A.C.
1—Whiting 5 ton 40′ span, 22′ lift, 220 V. A.C.

### GRINDERS
**Horizontal Disc (Flat) Grinders:**
Gardner #186, 30″ dia. disc. 10 HP, 220/440V, with dresser, wet or dry grinder.
Gardner HV5A, 18″ dia., 7½ HP, 440V, with dresser.
**Double End Disc:**
2—U.S. 18″ wheels, 2 swing tables.

### GRINDERS, SNAGGING
2—Hammond 10 WRI D. E. Snag. 20″ dia. wheels, 10 HP 220/440 v motors, variable speed drives.
1—3″ x 24″ U.S. #65, 20 HP 220/440V.

### GRINDERS, SWING FRAME
2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke, 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

### HOT METAL CARRIERS
3—1 ton D.C. Cab operated Cleveland, Monotractor Hot Metal Carriers.

### MOLDING MACHINES
**Jolt Squeezers:**
5—Milwaukee 103-11 Staty. Jolt Squeezers, 13½″ x 20″ table.
7—Champion JS10P Portable Jolt Squeeze molding machine. 18″ x 21″ table.
10—Osborn 275J.

**Jolt Squeeze Pin Lifts BIG**
2—Milwaukee Jolt Squeeze Strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.
1—Milwaukee 126-3 Jolt Squeeze Pin Stripper, 27″ x 21″ table, 8″ draw. Portable.
2—#165 Milwaukees.

### ROLLOVERS
1—Herman 4000# Series 30″ x 60″ table.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
1—Davenport 24 SA Jolt Rollover Pattern Draw. 26″ x 42″ flask size, 12″ draw.
3—Spo Model 9032.
1—Milwaukee 217.
2—International Type G, Portable, 20″ x 8″ draw.
3—Tabor Portable Rollover 30″
Johnson & Jennings 1020-44 x 44 max. Flask Size.

### PIN LIFT PUSHOFFS
1—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.

### MULLERS AND MIXERS
Simpson #3 Type H open gear type.
Beardsley & Piper #70 Speedmuller, New style cross head.

4 No. 2 Simpson Mullers U D

### OVENS, MOLD OR CORE
Despatch Type S, 2 cars 27½ x 54 x 64, Gas Fired.

### OVERHEAD TROLLEY CONVEYORS
5000′ Jervis B. Webb & Link Belt 658 chain, 4 D.C. motor drive and MG set.

### POURING DEVICES
3—Pouring devices, Whiting 500#.

### SAND SLINGERS
B & P Motive Sand Slinger 19″ 2 speed head
B & P Tractor type 13′

### SANDBELT CONVEYORS
160′-30″ Trough with Drives.
144′-30″ Flat with Drives.
47′-30″ Trough with Drives.

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3—Royersford 42′ x 72′ Roller Bearing, Chain Drive.
1—Sly Square 42 x 42 x64.
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1—27″ x 36″ Rubber Belt Wheelabrator

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*Sand Cast Division Only*

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### AIR & ELECTRIC HOISTS

1—INGERSOLL RAND RC-5 Air Bloc Hoist, 500 lb. capacity, pendant controls, with chain catch bucket.
1—INGERSOLL RAND Size C Air Hoist, 2000 lb. capacity.
1—CURTIS Class G Air Hoist, 3" dia. by 4' stroke.
1—COMET 1-Ton Electric Hoist, floor operated.
1—YALE & TOWNE 2-Ton Electric Hoist, spur geared, hand operated.

### AIR COMPRESSORS

1—GARDNER-DENVER 9 x 9 Type R9CG Air Compressor, 40 HP Motor, S/N 88395, complete with Magnetic Compensator, Stop-Start Switch, Air Receiving Tank and After Cooler; 220/440-3-60. SEE PHOTO
1—DEVILBISS Garage Type Air Compressor with 1½ HP Motor for 110/220 volts, and Tank.

### CLEANING EQUIPMENT

2—MOTT Sand Blast Barrels, Type ES1.
1—MOTT Hand Cleaning Cabinet.
2—MOTT Sand Blast Rooms, complete with pressure tanks and all safety equipment. SEE PHOTO

### CORE BLOWERS

1—OSBORN No. 91 Core Blower, with air clamping, capacity cores to 15 lb.
1—REDFORD No. 1 Core Blower, cartridge bench type.

### CORE KNOCKOUT SYSTEM
**New 1954—Consisting of:**

24" x 60' Horizontal Belt under Shakeout, 5 HP G.E. Motor and Jones 80 DH Reducer.
Simplicity 3' x 8' Shakeout No. 38-090-1A-123, with 5 HP L. A. Motor. SEE PHOTO
Incline Belt 24" x 105', 7½ HP G.E. Motor and Jones 90 DH Reducer, 18" x 24" Belt, Dings High Intensity Magnetic Pully, 2 HP. Master Motor, 1 KW Motor Generator Set.
Jeffrey 24" x 20" Double Roll Core Crusher, with 15 HP G.E. Motor.
Treads and Grating.
Overhead Storage Bin, 25-Ton capacity.

### CORE ROOM MISCELLANEOUS

2—CLIMAX No. 2A Wire Straighteners.
1—AMERICAN "Rapid" Core Machine, Style R, Serial No. 272, complete with base, ½ HP Motor, with Starter, Belt, Belt Guard and Pulley.
1—STONEY Core Knockout Machine, 17" stroke, 8" x 20" knockout head, 6" x 30" receiver head.
1—STONEY Core Grinder, 16" wheel, 48" travel.
16—Core Makers Benches.
12—ROSS Single Unit Core Drawers, with Vibrators.

### CORE OVENS

1—MAEHLER Single Compartment Core Oven, gas fired recirculating, with Leeds and Northrup controls; I.D. 96" long, 80" wide, 84" high. SEE PHOTO
2—MAEHLER Two Compartment Core Ovens, gas fired recirculating, with Leeds & Northrup controls; I.D. 78" long, 48" wide, 84" high.
50—Assorted Core Racks for the above Ovens, stationary and portable—will sell independently of ovens.

### FLASK EQUIPMENT

350 Sets STERLING Steel Flasks, all sizes.
100 HINES and FREMONT Aluminum Flasks, all sizes.

### HEAT TREAT FURNACES

1—INDUSTRIAL Normalizing Car Type Gas Fired Heat Treat Furnace, recirculating, with Leeds & Northrup controls; I.D. 7' long, 8' high, 8' wide.
1—AMERICAN Model 150-DC Heat Treat Furnace, I.D. 5" x 10" x 18", with controls, 1000° to 2350° F.

### LIFT TRUCKS & PAYLOADERS

3—AUTOMATIC Model P42748 Pallet Trucks 4000 lb. capacity, 7" hydraulic lift, electric power, fork type.
1—AUTOMATIC Trans Tractor, Type TRH, electric power, hand operated. NEW—NEVER USED.
1—BARRETT Hand Operated Platform Truck 25" x 54", off the ground, 4000 lb. capacity.
1—HOUGH Model HA Payloader, 12 cu. ft. hydraulic bucket.
2—Ready Power Units, 4 and 6 cylinder, 36 volt, gas operated, engine to generator.

### LIGHTING GENERATORS

2—KOHLER Electric Motor Generator Sets 1.5 KVA, 115 volt. 1 phase, 60 cycle, 1200 RPM, 4 HP AC Motor, with spare parts.
1—Lighting Generator, 50 KW, with 120 HP Buda Engine.

### MELTING FURNACES

25—LINDBERG-FISHER Type ATC No. 450 Crucible Stationary Melting Furnaces oil and gas fired, with motor and blower, controls and boarding platforms; some equipped with exhaust hoods.
3—LINDBERG-FISHER No. 1000 Crucible Stationary Melting Furnaces, oil and gas fired, with controls, motor and blower, and boarding platforms.
3—MONARCH Reverberatory Type Melting Furnaces, hand tilting, 2000 lb. capacity, oil and gas fired. SEE PHOTO
2—FISHER Model MNP Tilting Nose Pour Melting Furnaces, oil fired, 1700 lb. capacity, complete with four oil burners, sensitol valve, oil strainer, motor and reducer for tilting, and motor and blower.

### MOLDING MACHINES

15—INTERNATIONAL Model LJS Jolt Squeezers, 10" squeeze cylinder, stationary type.
2—INTERNATIONAL Type GS Jolt Rollover Pattern Draw Machines, Size 24 x 10.
1—INTERNATIONAL Type JDP Jolt Pin Lift Machines, Size 600 lb. x 8".
1—INTERNATIONAL Type PKL Jolt Squeeze Pin Lift Machine, Size 12 x 5½.
1—INTERNATIONAL Type RES Jolt Squeeze Rollover Draw Machine, Size 14 x 6.
4—INTERNATIONAL Type R Hand Core Rollovers, portable.
2—OSBORN No. 602 Jolt Rollover Pattern Draw Machine, table size 22" x 36", pattern draw 10", jolt capacity 750 lb.
1—OSBORN No. 2047 Jolt Rollover Pattern Draw, flask size 16" x 22", 10" depth, pattern draw 8½", jolt capacity 800 lb.
2—OSBORN No. 601 Jolt Rollover Pattern flask size 30", pattern draw 10", jolt capacity 600 lb.
2—OSBORN No. 75-J Jolt Squeezers, table size 16" x 20", squeeze cyl. 10", 22" adjustment between table and platen. IDEAL FOR SHELL MOLDING.
2—OSBORN No. 136 Rollover Core Box Drawing Machines, 18" x 36".
2—MILWAUKEE No. 104 Jolt Squeezers, 17" x 20" table, portable.

### MACHINE TOOLS

1—GOULD & EBERHARD Shaper
1—BLOUNT Double End Grinder
1—AVERY Type B Size 2, Single phase Drill Press, multiple speed, Coolant pump
1—WILSON Arc Welder, Model BA400 Serial No. 2-55-1044, 400 amps, 220 volt, 3 phase, 60 cycle.

### OVERHEAD SAND SYSTEM
**Capacity 60 Tons Per Hour—**
**New 1949-Consisting of:**

(2) Simpson No. 3 Unit Drive Intensive Mixers 2200 lb. Mullers, S. D. Air Operated, Plain Wearplate Crib Liner, complete with 40 HP Motors, Starters, and Dust Hoods.
Return Sand Bucket Elevator, 18" x 46' 10 HP G.E. Motor, Jones 105 DH Reducer, 66 Buckets.
Robins Conveyor, Style "M" Vibrex Screen, 48" x 120", Double Deck, 5 HP G.E. Motor.
Storage Bin Belt, 24" x 22', 3 HP L.A. Motor and Jones 80 DH Reducer.
Return Sand Spill Belt, 24" x 135', 7½ HP G.E. Motor and Jones 90 DH Reducer.
Return Sand Incline Belt, 20" x 20', 2 HP G.E. Motor and Falk Herringbone Reducer No. 403.
Feeder Apron Conveyor—Webster, 36" x 20', 10 HP G.E. Motor and Jones 105 DH Reducer.
Conditioned Sand Conveyor, 24" x 17', 3 HP L.A. Motor and Jones 80 DH Reducer.
Conditioned Sand Bucket Elevator, 18" x 37', 10 HP G.E. Motor and Jones 105 DH Reducer, 54 Buckets.
Overhead Storage Bin, 120 ton cap.
Aerator, 5 HP G.E. Motor.
Aerator Conveyor, 24" x 10', 3 HP L.A. Motor and Jones 80 DH Reducer.
Distributing Sand Conveyor, 24" x 156', 10 HP G.E. Motor and Jones 105 DH Reducer.
Webster Apron Casting Conveyor, 36" x 54' 7½ HP G.E. Motor and Jones 90 DH Reducer.
Return Sand Conveyor, 24" x 37', 7½ HP G.E. Motor and Jones 90 DH Reducer, 18" Dia. x 24" Belt, Dings High Intensity Magnetic Pulley—2 HP Master Motor—1 KW Motor Generator Set.
Robins Vibra-veyor, 36" x 164', with 25 HP Reliance Motor—handle Shakeout Sand and Castings.
(23) Hoppers with Brandford Air Operated Vibrators.
No. F-5 Syntron Feeder Conveyor, complete with FC Controller, 30" wide x 78" long.
Type N No. 12 Rotoclone, 25 HP Motor, Gratings and Treads.

### SAND CUTTERS

2—AMERICAN Type AA Sandcutters, 54" cutting cylinder, 220/440 volt 3 phase 60 cycle.
2—BEARDSLEY & PIPER Model M Screenerators, portable on pneumatic tires, capacity 1000 lb. per min., hopper size 30" x 30", with 3 HP Motor and electrical.

### SAND MULLERS

1—BEARDSLEY & PIPER No. 50 Speedmuller 9 cu. ft. batch size, complete with 50 HP Motor and electrical, dust hood, skip hoist loader, water meter etc.

### TRIMMING EQUIPMENT

5—L'HOMMEDEAU Polishing Lathes No. 20-B, double wheel, with 10 HP Motor and controls. SEE PHOTO
2—CRESCENT Metal Cutting Band Saws, 36" throat, with 5 HP Motor and electrical. SEE PHOTO
1—DEWALT Model ME2 Metal Cutting Radial Cut-off Saw, foundry type, with 10 HP Motor and controls. SEE PHOTO

### ROLLER & BELT CONVEYOR

50' MATHEWS 36" wide Heavy Duty Roller Conveyor, 2-9/16" dia. on 4" centers
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5—AMERICAN Tramrail Systems, consisting of 75' long runways, with (9) 20' span bridges, rated capacities from 1-Ton to 5-Ton; both manually and electrically operated bridges. Will sell individually.
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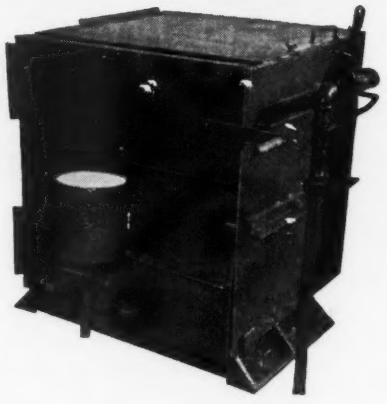

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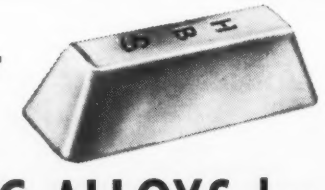

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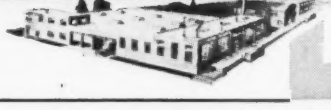

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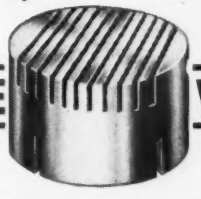

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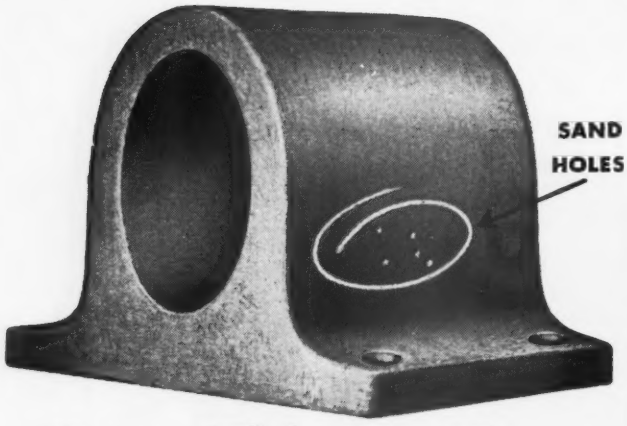


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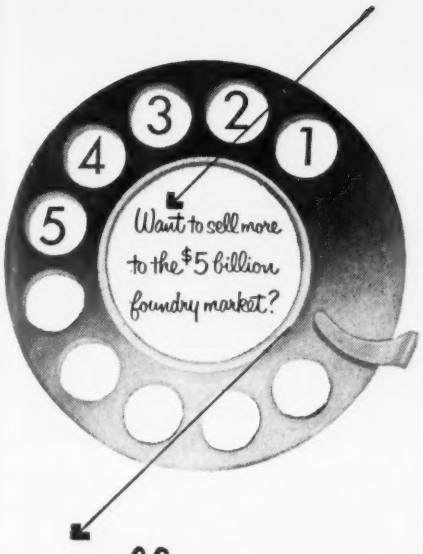


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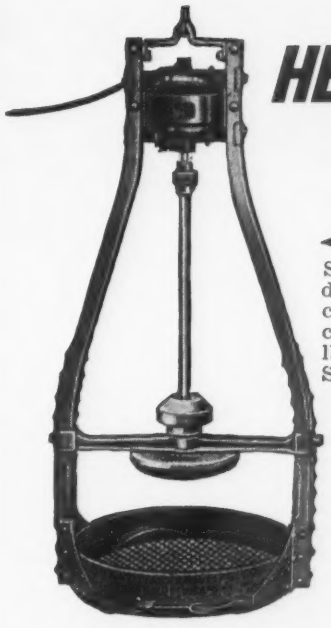
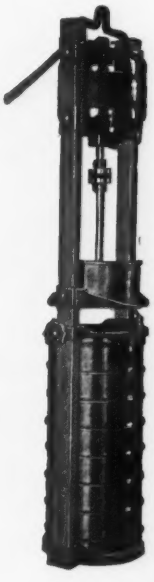
# BOTTLENECK IN PRODUCTION?

# HERE'S HEADACHE REDUCTION!



← **Type "V"**

Screens sand Fine, Coarse, Medium, 20″ dia. sieve with special clamp for 5-second changes. Does work of 10 men. Fully-enclosed 1/6 h.p. motor. 4′ 6″ high, weight 100 lbs. 20″ Sieve: $275.00. Giant V-5, 36″ Sieve: $495.00.



← **Type "HL"**

Laboratory model . . . specially designed for sand control. Fitted with 1/6 H.P. motor. Price, complete less sieves: $250.00.

← **Type "CR"**

24″ dia. round sieve. Thoroughly sifts, mixes, fluffs, aerates the sand. ⅓ H.P. enclosed motor. Height 4′6″, weight 250 lbs. Complete: $350.00.

**Type "CS"**

24″ square sieve. Continuous operation, no dumping. Refuse tails off to one side. Height 4′10″, weight 295 lbs. With ⅓ h.p. enclosed motor. Complete: $360.00.

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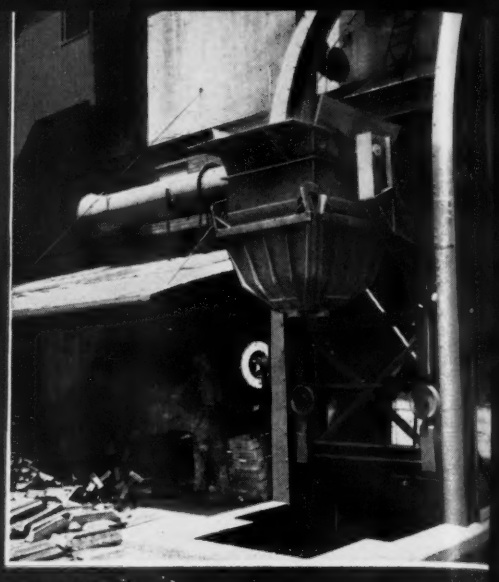
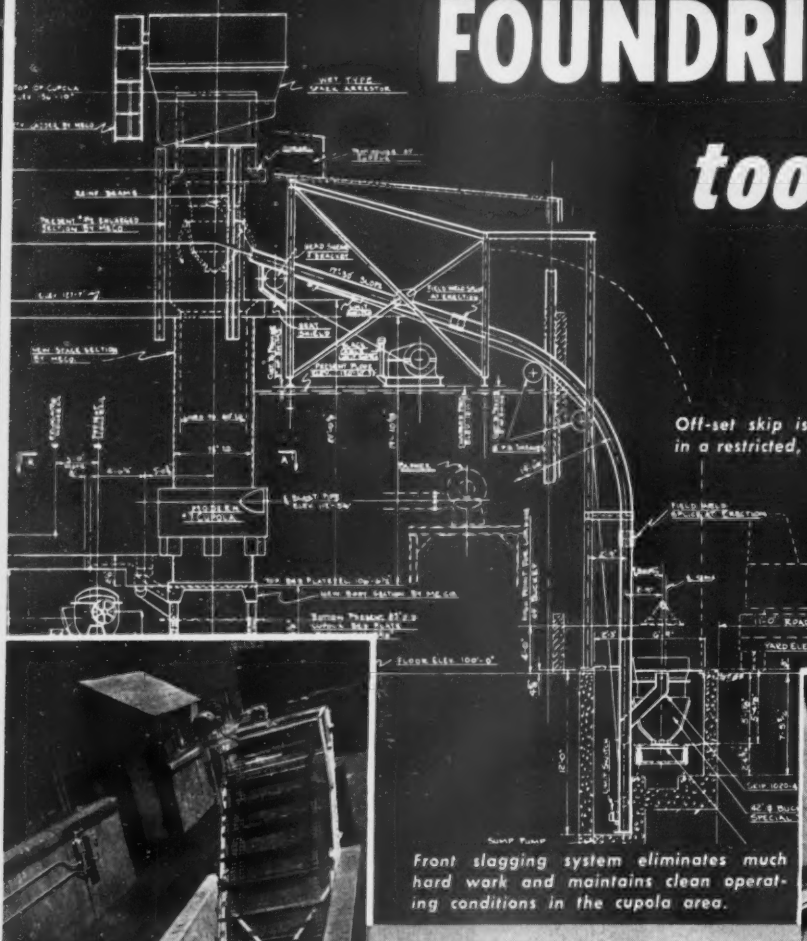
**GREAT WESTERN MFG. CO.**

**LEAVENWORTH • KANSAS**

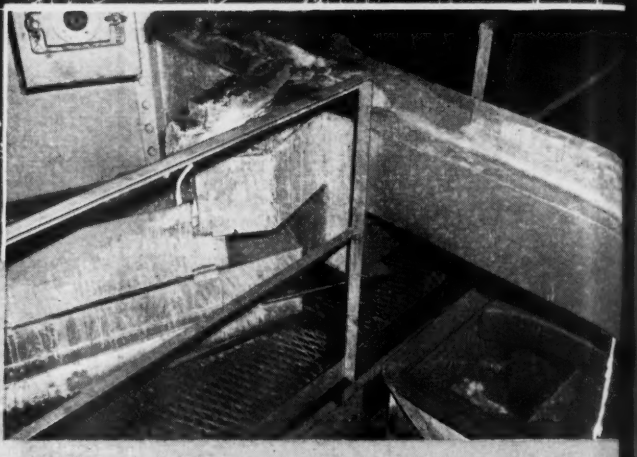
# AUTOMATION *for* FOUNDRIES *too!*



*Off-set skip is designed for accessibility in a restricted, yard area.*



*Front slagging system eliminates much hard work and maintains clean operating conditions in the cupola area.*



Conveyor at de-watering tank travels 6' a minute.

## ENGINEERING...
## MANUFACTURING...
## ERECTION...

**Ever since MODERN engineered the first, skip-type, mechanical charger an array of automatic controls has continued to ease the work for foundrymen. From Monday's start to Friday's shake-out the costs of the castings are closely controlled. Push button operation, here at Producto Machine Company, already includes:**

- **Automatic cycling of the small-cone bucket between pit and trip switch . . .**
- **Slag flowing continuously from front-spout to drag-out . . .**
- **Dust and ash are trapped behind a water curtain . . .**
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*etal is thoroughly mixed as it flows continuously through the 4000 lb., MODERN forehearth.*

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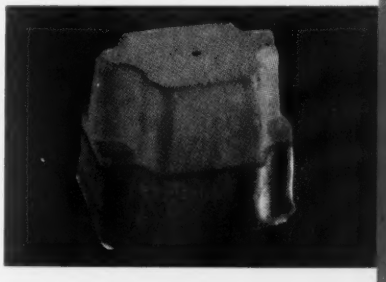
# NEW...FOR YOU FROM STEVENS

## THESE NEW PRODUCTS WILL IMPROVE YOUR FOUNDRY OPERATIONS

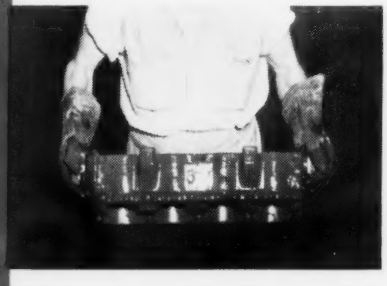
### IGNICOAT—FAST DRYING MOLD SPRAY

Eliminates lengthy drying of mold coating by torch or oven. Can be sprayed, brushed or swabbed. Ignicoat mixes rapidly with isopropyl alcohol and contains the proper percentage of binder to insure good film adherence to the sand. When ignited, burns with a gentle flame. Molds may be closed and poured as soon as burning stops.

### RED-SKIN CORE COATING



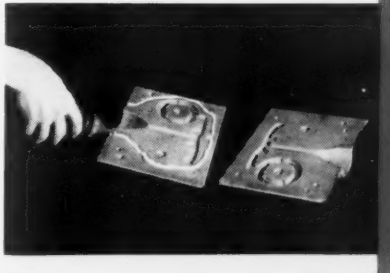
Does not run, streak, tear-drop or pile up at the edge of the core. It is a refractory type core coating that insures clean peel of sand from castings. The new Stevens Red-Skin reduces costs and aids in the production of better castings when used on molds and cores for steel, grey iron and non-ferrous metals. Red-Skin has deep penetration and seals several layers of sand, to prevent metal penetration.



### GRAPH-KOTE COATING

Graph-Kote is a "short" coating which means a sharp dip line. It coats only where the coating is needed, assuring accurate fitting of core prints and assemblies. Cores can be dipped faster and its even uniform coating gives ample coverage to produce clean castings. In its original paste form, Graph-Kote can be stored indefinitely in the original Stevens polyethylene lined drums.

### NEW IMPROVED FASTICK LIQUID CORE PASTE



Has very rapid air or oven drying qualities. Gives excellent results with resin-bonded cores and shell molds. Permits elimination of clamps on shell mold halves. Strength is not reduced at high temperatures. As a time saver, Fastick will reduce your costs as it is mixed and ready to use when received.

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